#10407

SFUND-2001-0009-0011

HRS DOCUMENTATION RECORD--REVIEW COVER SHEET

Name of Site: Sauget Area 1

EPA Identification No.: ILD980792006

Contact Persons

Site Investigation:	Michael McAteer USEPA Region 5 Chicago, IL	(312) 886-4663
Documentation Record:	Ashley Jeffress DynCorp I&ET Alexandria, VA	(703) 461-2000

Pathways, Components, or Threats Not Scored

Ground water analytical data indicate that surficial ground water contamination is present (Ref. 4a, p. 4-5; Ref. 40a, App. B-2). However, this surficial ground water is not used as a drinking water source in the area and the extent of the threat posed by this contamination is not scored in this HRS documentation package.

Several residences are located adjacent to and have unrestricted access to portions of the Sauget Area 1 site. In addition, analytical data indicate that contaminated soil may be present on residential properties (Ref. 10, p. 116; Ref. 63, pp. 15-23). However, current information is insufficient to evaluate the threat posed to nearby individuals and residents.

Insufficient documentation is available to evaluate the threat posed by air migration. Therefore, the air migration pathway is not scored in this HRS documentation package.

HRS DOCUMENTATION RECORD

Name of Site:	Sauget Area 1
EPA Identification No.:	ILD980792006

U.S. EPA Region	:	5	Date Prepared: May, 2001
Street Address of Site	:	Various in Cahokia and Sauget	
County and State	:	St. Clair County, Illinois	
General Location in the State	:	Southwestern Illinois	
Topographic Map	:	Cahokia, Illinois	

Latitude:	Longitude:
38° 35' 09.0"	90° 10' 22.5"

The latitude and longitude measurements are for the southern portion of Source 2 (Ref. 8).

Scores

Air Pathway	NS[1]
Ground Water Pathway	NS
Soil Exposure Pathway	NS
Surface Water Pathway	100.0
HRS SITE SCORE	50.0

[1]NS = Not scored

WORKSHEET FOR COMPUTING HRS SITE SCORE

		S	S^2
1.	Ground Water Migration Pathway Score (S_{gw}) (from Table 3-1, line 13)	NS	NS
2a.	Surface Water Overland/Flood Migration Component (from Table 4-1, line 30)	100	-
2b.	Ground Water to Surface Water Migration Component (from Table 4-25, line 28)	NS	-
2c.	Surface Water Migration Pathway Score (S_{sw}) Enter the larger of lines 2a and 2b as the pathway score.	100	10,000
3.	Soil Exposure Pathway Score (S_s) (from Table 5-1, line 22)	NS	NS
4.	Air Migration Pathway Score (S_a) (from Table 6-1, line 12)	NS	NS
5.	Total of $S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2$		10,000
6.	**HRS Site Score** Divide the value on line 5 by 4 and take the square root		50.0

SURFACE WATER OVERLAND FLOOD MIGRATION COMPONENT SCORESHEET

Factor Categories and Factors			Maximum Value	Value Assigned
Drinking Water Threat				
	Likelihood of Release			
1.	Observed Release		550	550
2.	Potential to Release by Overland Flow			
	2a.	Containment	10	NS
	2b.	Runoff	25	NS
	2c.	Distance to Surface Water	25	NS
	2d.	Potential to Release by Overland Flow [lines 2a x (2b +2c)]	500	NS
3.	Potential to Release by Flood			
	3a.	Containment (Flood)	10	NS
	3b.	Flood Frequency	50	NS
	3c.	Potential to Release by Flood [lines 3a x 3b]	500	NS
4.	Potential to Release [lines 2d + 3c, subject to a maximum of 500]		500	NS
5.	Likelihood of Release [higher of lines 1 and 4]		550	550
	Waste Characteristics			
6.	Toxicity/Persistence		a	NS
7.	Hazardous Waste Quantity		a	100
8.	Waste Characteristics		100	NS
	Targets			
9.	Nearest Intake		50	NS
10.	Population			
	10a.	Level I Concentrations	b	NS
	10b.	Level II Concentrations	b	NS
	10c.	Potential Contamination	b	NS
	10d.	Population [lines 10a + 10b + 10c]	b	NS
11.	Resources		5	NS
12.	Targets [lines 9 + 10d + 11]		b	NS
	Drinking Water Threat Score			
13.	Drinking Water Threat Score [(lines 5 x 8 x 12)/82,500, subject to a maximum of 100]		100	NS

NS = Not Scored

SURFACE WATER OVERLAND FLOOD MIGRATION COMPONENT SCORESHEET (Cont.)

Factor Categories and Factors		Maximum Value	Value Assigned
Human Food Chain Threat			
	Likelihood of Release		
14.	Likelihood of Release [same value as line 5]	550	550
	Waste Characteristics		
15.	Toxicity/Persistence/Bioaccumulation	a	5×10^8
16.	Hazardous Waste Quantity	a	100
17.	Waste Characteristics	1,000	320
	Targets		
18.	Food Chain Individual	50	20
19.	Population		
	19a. Level I Concentrations	b	0
	19b. Level II Concentrations	b	0
	19c. Potential Human Food Chain Contamination	b	3.1×10^{-5}
	19d. Population [lines 19a + 19b + 19c]	b	3.1×10^{-5}
20.	Targets [lines 18 + 19d]	b	20.000031
	Human Food Chain Threat Score		
21.	Human Food Chain Threat Score [(lines 14 x 17 x 20)/82,500, subject to a maximum of 100]	100	42.67

REFERENCES

Reference Number	Description of the Reference
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2	EPA. *Superfund Chemical Data Matrix.* June, 1996. 1 page (excerpt).
3a	Illinois Environmental Protection Agency (IEPA) [Ecology & Environment, Inc. (E&E)]. *Expanded Site Investigation Dead Creek Project Sites at Cahokia/Sauget, Illinois.* Volume 1 of 2. May 1988. 457 pages. (Page numbers on selected pages bolded by PRC).
3b	IEPA (E&E). *Expanded Site Investigation Dead Creek Project Sites at Cahokia/Sauget, Illinois.* Volume 2 of 2. May 1988. 549 pages.
4a	IEPA. *CERCLA Screening Site Inspection Report.* Volume 1 of 2. 1992. 130 pages.
4b	IEPA. *CERCLA Screening Site Inspection Analytical Results.* Volume 2 of 2. 1992. 162 pages.
5	Monsanto Company (Geraghty & Miller, Inc). *Site Investigation for Dead Creek Sector B and Sites L and M, Sauget-Cahokia, Illinois.* March 1992. 456 pages.
6	The Avendt Group, Inc. *Site Investigation/Feasibility Study for Creek Segment A.* Volume 1 of 2. June 1990. 333 pages. Plate 1, Aerial Photograph. Plate 2, Topographic Survey. Plate 3, Stormwater Collection Facility Site Plan and Profile.
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8	U.S. Geological Survey (USGS). Cahokia Quadrangle, Illinois-Missouri, 7.5 Minute Series Topographic Map. 1993. 1 page.
9	Village of Monsanto. 1932. Sewer System, Key Plan for Proposed Sewer Lines. Prepared by B.C. McCurdy, Engineer. Map obtained during review of IEPA files. May 1993. 1 page.
10	Solutia, Inc. (O'Brien and Gere Engineers, Inc). EE/CA and RI/FS Support Sampling Plan, Sauget Area 1, Sauget and Cahokia, Illinois. June 1999. 166 pages, 24 tables, 11 figures.
11	Author Unknown. Aerial Photograph Depicting Sauget Area as of June 27, 1950. Photograph obtained during review of IEPA files on May 1993. 1 page.

12 Author Unknown. Aerial Photograph depicting Sauget Area as of July 12, 1955. Photograph obtained during review of IEPA files on May 1993. 1 page.

13 St. John, Ron, IEPA. *A Preliminary Hydrogeologic Investigation in the Northern Portion of Dead Creek and Vicinity.* April 1981. 102 pages.

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18 Author Unknown. Aerial Photograph depicting Sauget Area as of September 19, 1937. Photograph obtained during review of IEPA files. May 1993. 1 page.

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20 Letter regarding pole-drilling incident of September 20, 1989. From Joseph Grana, Manager of Environmental and Energy Affairs, Cerro Copper Products Co. (Cerro). To Paul Takacs, IEPA, DLPC. October 4, 1989. 2 pages.

21 Letter regarding possible health effects associated with substances found in samples collected from boring at which incident of September 20, 1989 took place. From Thomas Long, Senior Toxicologist, Environmental Toxicology Program, Illinois Department of Public Health (IDPH). To Robert Gussmann. May 17, 1990. 4 pages.

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23 Manufacturer's News, Inc. 1993. Illinois Manufacturers Directory. 4 pages.

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28 Author Unknown. *Report on Industrial Waste Discharge from Industries at Monsanto.* Interview with Mr. McCurdy, City Engineer for the Village of Monsanto. Prepared by Senior Sanitary Engineer, affiliation unknown, name illegible. March 6, 1942. 3 pages.

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36	Record of Telephone Conversation Regarding Commercial Fishing on the Mississippi River. Between Julie Kaiser, Environmental Scientist, PRC, and Ed Walsh, IDOC, Streams Program. August 6, 1993. 1 page.
37	Letter Regarding Mammals, Reptiles, and Amphibians near the Sauget Area 1 Site. From Scott R. Ballard, Natural Heritage Biologist, IDOC. To Eric Morton, PRC. July 21, 1993. 4 pages.
38	Letter Regarding Recent Flooding of Creek Segment B (Source 2). From Paul Takacs, Project Manager, IEPA. To Alan Altur, Illinois Site Assessment Manager, EPA. November 2, 1993. 33 pages.
39	Letter Regarding Undeveloped Area Sample Results/Locations. From D. M. Light, Solutia, Inc., Coordinator, Sauget Sites Area 1. To M. McAteer, EPA Region 5. July 13, 2000. 32 pages.
40a	Solutia, Inc (O'Brien and Gere Engineers, Inc). Data Validation Report, Sauget Area 1 Site, Support Sampling Project. (Includes laboratory analytical data). August 2000. 289 pages, 6 appendices.
40b	Excerpt from Reference 40a: Solutia, Inc (O'Brien and Gere Engineers, Inc). Data Validation Report, Sauget Area 1 Site, Support Sampling Project. (Includes laboratory analytical data). August 2000. 111 pages.
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42	Record of Telephone Conversation Regarding Fisheries. Between Julie Kaiser, Environmental Scientist, PRC, and Desk Officer, Village of Cahokia Police Department. July 30, 1993. 1 page.
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59 Letter Regarding Apparent Tanker Truck Discharges into Dead Creek. From R.L. Schleuger, Supervisor, Mississippi Basin Surveillance Section, IEPA. To Harold Waggoner & Co. August 6, 1971. 1 page.

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62 EPA. Notification of Hazardous Waste Site - Monsanto-W.G. Krummrich Plant. May 15, 1981. 2 pages.

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64 Letter Regarding Endangered and Threatened Species in the Sauget Area - Follow-up. From Deanna Glosser, Illinois Department of Natural Resources. To Ted Prescott, IEPA. March 15, 2000. 2 pages.

65 EPA. Preliminary Ecological Risk Assessment for Sauget Area 1, Creek Segment F. August 31, 1997. 85 pages.

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ABBREVIATIONS

bgs	=	Below ground surface
Cerro Copper	=	Cerro Copper Products Company
cfs	=	Cubic feet per second
CLP	=	Contract Laboratory Program
DOI	=	U.S. Department of the Interior
EPA	=	U.S. Environmental Protection Agency
ESI	=	Expanded Site Investigation
ft	=	Feet
ft^2	=	Square feet
HRS	=	Hazard Ranking System
HWQ	=	Hazardous waste quantity
IDOC	=	Illinois Department of Conservation
IDPH	=	Illinois Department of Public Health
IEPA	=	Illinois Environmental Protection Agency
Midwest Rubber	=	Midwest Rubber Company
Monsanto	=	Monsanto Chemical Company
NA	=	Not applicable
ND	=	Not detected
NE	=	Northeast
NS	=	Not scored
NW	=	Northwest
NWI	=	National Wetlands Inventory
PCB	=	Polychlorinated biphenyls
PPE	=	Probable point of entry
ppm	=	Parts per million
RCRA	=	Resource Conservation and Recovery Act
Ref.	=	Reference
RI/FS	=	Remedial Investigation/Feasibility Study
SCDM	=	Superfund Chemical Data Matrix
SI	=	Site Inspection
Solutia	=	Solutia, Inc.
SSI	=	Screening Site Investigation
SVOCs	=	Semi-volatile organic compounds
TDL	=	Target distance limit
TOC	=	Total organic carbon
TSCA	=	Toxic Substances Control Act
USGS	=	U.S. Geological Survey
VOCs	=	Volatile organic compounds
yd^3	=	Cubic yards

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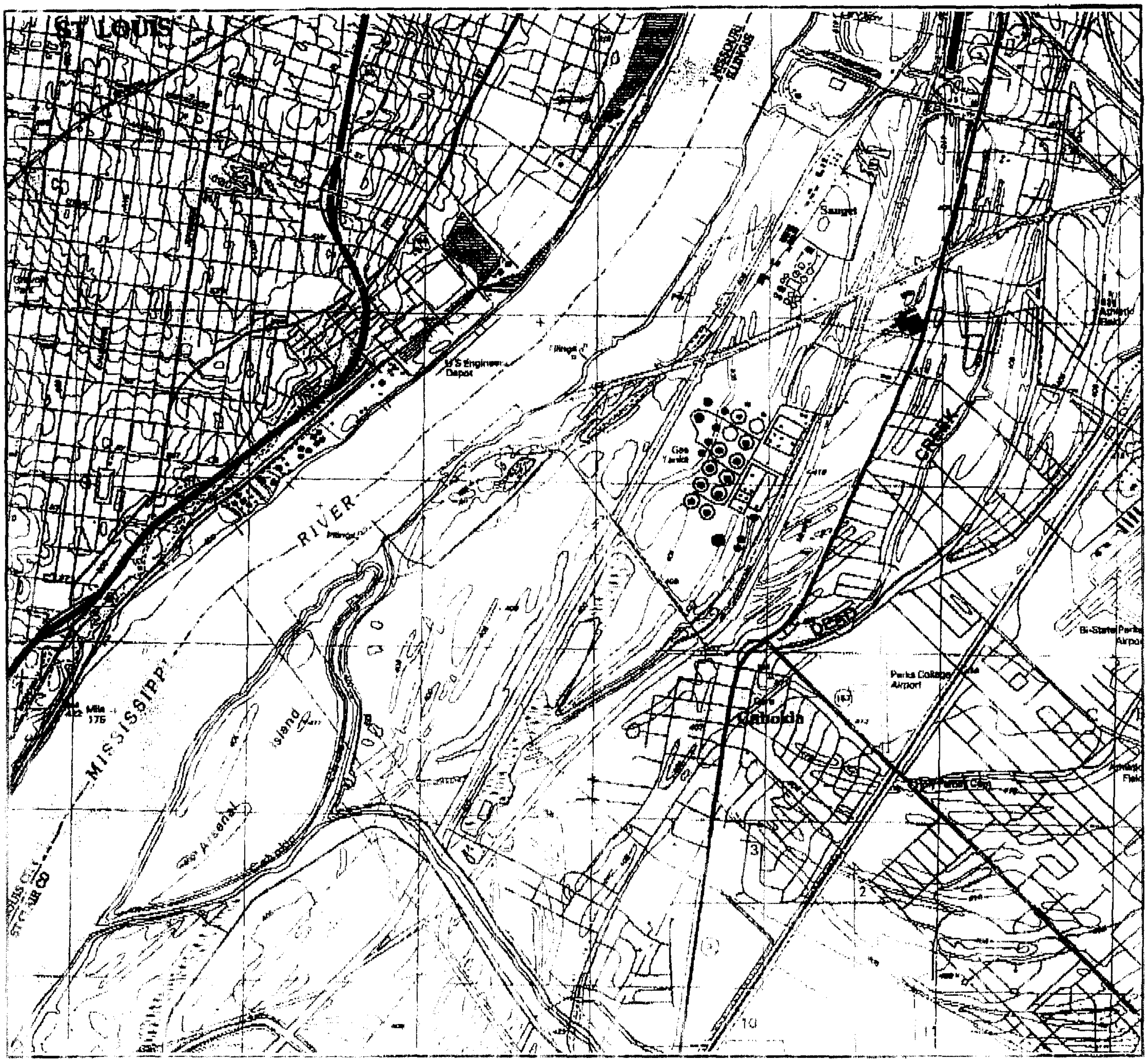

Source: Base Map is a Portion of the Following 7.5 Minute Series U.S.G.S Quadrangle : Cahokia, IL-MO, 1998

FIGURE 1	SITE LOCATION MAP
0 0.5 1 MILES N	SAUGET AREA 1
	SAUGET AND CAHOKIA, ILLINOIS
	DATE: FEBRUARY 16, 2001

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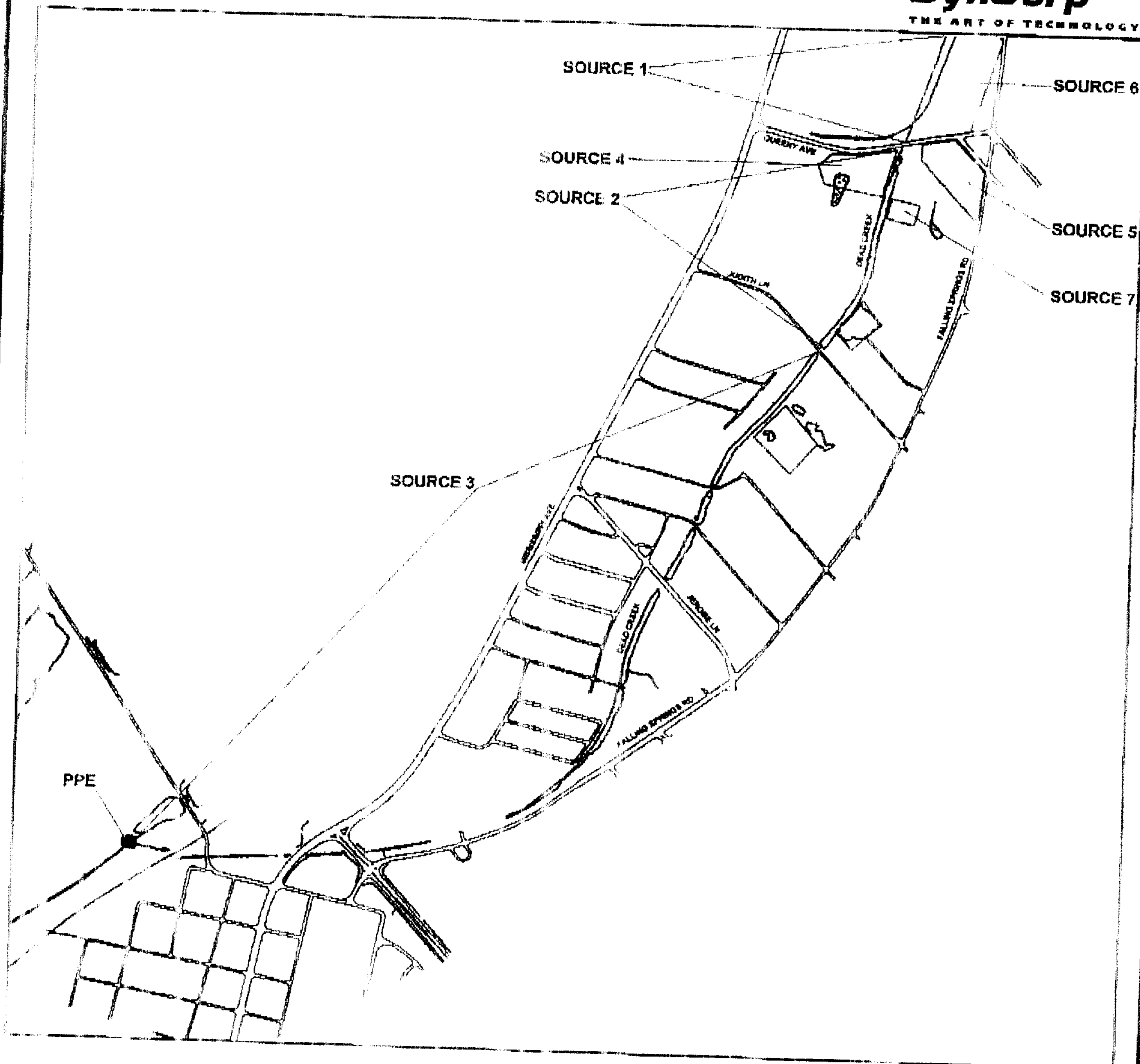
THE ART OF TECHNOLOGY



Source: Sample Location Maps for Sauget Area 1, **RI/FS Investigation**, Solutia, Inc., July, 2000

FIGURE 2	SOURCE LOCATION MAP
600 0 600 SCALE IN FEET; N	SAUGET AREA 1
	SAUGET AND CAHOKIA, ILLINOIS
	DATE: FEBRUARY 16, 2001

SUMMARY OF SOURCES EVALUATED

Source Number	Source Name	Source Type
1	CS-A (Dead Creek segment A)	Buried/backfilled surface impoundment
2	CS-B (Dead Creek segment B)	Surface impoundment
3	CS-C, CS-D, CS-E, and CS-F to the PPE (Dead Creek segments C, D, E, and part of F)	Contaminated soil
4	Area G	Landfill
5	Area H	Landfill
6	Area I	Landfill
7	Area L	Buried/backfilled surface impoundment

SITE DESCRIPTION

The Sauget Area 1 site is located in the Village of Sauget (formerly the Village of Monsanto) and the Village of Cahokia, St. Clair County in southwestern Illinois (Figure 1). The site being listed includes the release of hazardous substances to Dead Creek and downstream water bodies. This release threatens downstream wetlands, fisheries, and endangered and threatened species' habitats. The sources of hazardous substances include segments of Dead Creek, as well as three landfills and one buried/backfilled surface impoundment that are adjacent to Dead Creek (Figure 2). The area around the site is used primarily for industrial purposes, but also includes residential and agricultural land uses (Ref. 3a, p. 2-25; Ref. 10, p. 2). Portions of Dead Creek are located in residential neighborhoods. Access to portions of the creek is unrestricted and children have been observed walking in the creek bed (Ref. 14, pp. 1-5, 1-6; Ref. 24, pp. 15, 17).

This release is the result of the shared waste disposal practices of several different companies located along Dead Creek, all of whom have released hazardous substances to the creek and to sources adjacent to the creek (Ref 3a, p.2-5; Ref. 4a, pp. 2-7, 4-3; Ref. 14, p. 2; Ref. 16, p. 2; Ref. 22, pp. 12-13; Ref. 28, p. 2; Ref. 50, p. 1; Ref. 56, p. 1; Ref. 59, p. 1; Ref. 60, p. 1; Ref. 61, p. 1; Ref. 62, p. 1). The releases resulting from these shared waste disposal practices have commingled and migrated downstream through Dead Creek and into the perennial wetland along creek segment F (CS-F).

Industries located along Dead Creek have disposed of waste in the creek since prior to the late 1930s (Ref. 28, p. 2). Water levels in the upper portion of Dead Creek vary substantially and the creek becomes a dry ditch during periods of low precipitation (Ref. 3a, p. 2-8; Ref. 24, pp. 17, 18). Therefore, the upper portion of Dead Creek is considered an intermittent stream. Portions of Dead Creek have been altered as a result of the waste disposal activities. The uppermost portion of Dead Creek, creek segment A (CS-A) (evaluated as Source 1), was used as a surface impoundment and received industrial wastewater from Monsanto Chemical Company, an industrial chemical manufacturer, and Cerro Copper Company, a copper tubing and electrolytic copper cathode manufacturer (Ref. 4a, p. 2-7; Ref. 22, pp. 5, 12; Ref. 23, p. 2). [Monsanto Chemical Company exists now as a part of the corporate entity Solutia, Inc., an industrial chemical manufacturer currently operating the facility in Sauget.] A culvert at the downstream end of CS-A was sealed some time in the late 1960s to early 1970s in response to area residents' concerns about hazardous substances migrating downstream through the creek (Ref. 5, p. 1-3; Ref. 22, p. 5). However, based on observations, water continued to flow past the culvert from CS-A to downstream creek segments (Ref. 13, p. 19). A removal action was conducted at CS-A in 1990 to remove part of the contaminated sediment, soil, and water. Releases of hazardous substances from this source have contributed to the contamination still present on site.

Creek segment B (CS-B) (evaluated as Source 2) has also been used as a surface impoundment and received direct wastewater discharges from Midwest Rubber Company, a rubber reclaiming company, and from Waggoner Trucking Company, an industrial waste hauling company (Ref. 23, p. 3; Ref. 50, p. 1; Ref. 59, p. 1). A culvert at the downstream end of CS-B was sealed some time in the 1960s to early 1970s in response to area residents' concerns about hazardous substances migrating downstream through the creek (Ref. 5, p. 1-3; Ref. 11; Ref. 22, p. 5; Ref. 32). However, based on observations, water continues to flow past this culvert from CS-B to downstream creek segments. CS-B floods during periods of heavy precipitation, allowing water to come into contact with other sources and to flow onto a nearby road (Ref. 13, p. 19; Ref. 38, p. 1; Ref. 51, p. 1).

Creek segment C (CS-C), creek segment D (CS-D), creek segment E (CS-E), and the intermittent portion of creek segment F (CS-F) (evaluated as Source 3) receive runoff directly from Source 2 and from all other sources via Source 2. Source 3 drains directly to a perennial wetland along CS-F (Figure 2).

Drainage from the three landfills (evaluated as Sources 4, 5, and 6) and the buried/backfilled surface impoundment (evaluated as Source 7) adjacent to Dead Creek is generally toward Dead Creek segments CS-A and CS-B (Ref. 10, pp. 3-4). Source 4 was a landfill that received chemical waste, demolition debris, and scrap metal wastes (Ref. 3a, p. 2-5; Ref. 14, p. 2; Ref. 56). A removal action was conducted at Source 4 in 1995 to remove part of the contaminated soils on and around the source (Ref. 10, p. 7; Ref. 22, pp. 3-4). Releases of hazardous substances from this source have contributed to the contamination still present on site (Ref. 22, p. 3). Sources 5 and 6 are landfills that were used by Monsanto Chemical Company for the disposal of chemical wastes as early as the 1950s and as late as the 1980s (Ref. 4a, p. 4-3; Ref. 22, pp. 3, 12; Ref. 61, p. 1; Ref. 62, p. 1). Source 7 is a buried /backfilled surface impoundment that was constructed by Waggoner Trucking Company in 1971 after they were directed by IEPA to eliminate any discharges to Dead Creek (Ref. 59, p. 1; Ref. 60, p. 1). These discharges were subsequently redirected into Source 7.

Solutia conducted extensive sample collection activities at Sauget Area 1 from September 1999 through May 2000 for an RI/FS (Ref. 40a, p. 1). Among other hazardous substances, PCBs, arsenic, cadmium, chromium, copper, lead, mercury, and zinc were detected in samples collected from source areas (Ref. 40a, App. B-4, App. C-4; App. B-1, App. C-1). Sampling events conducted at Source 1 and Source 4 prior to any removal actions indicated the presence of PCBs and metals in both sources (Ref. 3a, pp. 2-65, 4-102; Ref. 4a, p. 2-13; Ref. 6, pp. 27, 67, 69, 84, 85). In October 1999, Solutia collected sediment samples from the wetland along CS-F for the RI/FS (Ref. 40a, App. B-4, C-4). These samples document an observed release by chemical analysis of PCBs, cadmium, copper, lead, mercury, and zinc to the wetland (Ref. 39, pp. 3-11; Ref. 40a, App. B-4, App. C-4). Sediment samples collected from the wetland by EPA in April 1997 also document an observed release by chemical analysis of Aroclor-1254, cadmium, lead, and mercury (Ref 65, pp. 2-3, 2-10, C-2, C-3). The observed releases by chemical analysis documented in the wetland along CS-F reflect commingled contamination from each source at the site.

The hazardous substance migration path continues downstream of the wetland to Old Prairie duPont Creek, the Cahokia Chute of the Mississippi River and, subsequently, to the main channel of the Mississippi River (Figure 1). The black-crowned night heron, a State designated endangered species in Illinois, has been documented in the wetland along CS-F (Ref. 65, p. 2-3). Habitats known to be used by four Federal designated endangered or threatened species and by nine State designated endangered or threatened species exist within the 15-mile TDL (Ref. 29, pp. 3-5; Ref. 30; Ref. 31; Ref. 37, p. 1; Ref. 41; Ref. 46; Ref. 64; Ref. 65, p. 2-2; Ref. 66). Approximately 6,000 ft of wetland frontage are scored as subject to Level II concentrations and approximately 12.82 miles of wetland frontage are scored as subject to potential contamination (Ref. 25, Ref. 26, Ref. 27; Ref. 39, pp. 3-11). In addition, Old Prairie duPont Creek, the Cahokia Chute, and the Mississippi River are used for recreational and commercial fishing (Ref. 42; Ref. 43; Ref. 45).

SOURCE DESCRIPTION

2.2 Source Characterization

Source Number: 1

Source Name (type): CS-A (buried/backfilled surface impoundment)

Source 1 is an historical impoundment made from the northern 1,519 ft of what was part of Dead Creek, located north of Queeny Avenue and south of the Alton & Southern Railroad (Figure 2; Ref. 4a, p. 4-93; Ref. 6, p. 56; Ref. 7, p. 10; Ref. 11). Source 1 is located on property owned by Cerro Copper (Ref. 6, p. 2; Ref. 22; p. 13). A 1990 report prepared for Cerro Copper and a 1932 map of sewer lines for the Village of Monsanto (now the Village of Sauget) indicate that Dead Creek originated north of the railroad on property owned by Monsanto (Ref. 6, pp. 2, 3; Ref. 9). Aerial photographs suggest that the portion of Dead Creek upstream of Source 1 was filled in sometime prior to 1937 (Ref. 18). As a result, Dead Creek no longer has any natural headwaters.

Aerial photographs indicate Source 1 was first modified to act as an impoundment some time between 1940 and 1950 (Ref. 11; Ref. 48). The 1950 aerial photograph shows Source 1 appearing wider and holding more water than downstream segments of Dead Creek (Ref. 11). The length and average width of Source 1 was determined during field activities conducted in 1989 for a Site Investigation/Feasibility Study for CS-A (Ref. 6, p. 56). During these activities Source 1 was delineated into eight zones and the average width, length, and depth were determined for each zone. Summing the width of each zone and dividing by eight results in an average width for Source 1 of 59.5 ft (Ref. 6, p. 56). The length was measured to be 1,519 ft (Ref. 6, p. 56). Therefore, the area of Source 1 is approximately 90,380.5 ft^2.

Source 1 was originally divided into two holding ponds that were periodically dredged. The dredged material was placed in an adjacent landfill (Source 6) (Ref. 4a, p.4-12; Ref. 13, p. 19; Ref. 22, pp. 3, 4, 5). After the culvert at the southern end of Source 1 was blocked, Source 1 was graded so water would flow to the north into a catch basin installed by Monsanto. The water entering this catch basin was then pumped to the Cahokia sewage treatment plant (Ref. 13, p. 19). This source historically received direct wastewater discharges from industrial processes, including from the Monsanto and Cerro Copper facilities (Ref. 22, pp. 5, 12, Ref. 28). Monsanto manufactured industrial chemicals and Cerro Copper manufactures copper tubing and electrolytic copper cathodes (Ref. 23, p. 3). Source 1 has also served as a surcharge basin for the Village of Sauget, receiving untreated wastes when the municipal sewer collection system became backed up or overflowed (Ref. 4a, p. 2-7; Ref. 22, pp. 5, 12; Ref. 28). Source 1 also received direct stormwater runoff from Cerro Copper through drain pipes in the western bank of Source 1 (Ref. 6, p. 5).

The culvert at Queeny Avenue was supposedly permanently sealed in the late 1960s to early 1970s in response to area residents' concerns about hazardous substances in the upper portions of Dead Creek migrating to the lower portions of the creek (Ref. 5, p. 1-3; Ref. 22, p. 5). According to a 1981 report, IEPA observed water flowing downstream from Source 1 to Source 2, which is located immediately south of Source 1 (Figure 2). The flow may have been the result of a storm sewer that entered into the culvert, but it is also possible that the culvert was not completely sealed (Ref. 13, p. 19; Ref. 22, p. 5). Additional reports to the Bureau of Water Pollution Control also indicate that the culvert at Queeny Avenue may not have been completely sealed. In March 1971, a Cahokia Health Officer and two Sauget area residents independently reported observing a yellow substance flowing from Source 1, through the Queeny Avenue culvert, and into Source 2 (Ref. 16, pp. 1, 2; Ref. 17, p. 1). A subsequent investigation by the Sanitarian for the Mississippi Basin revealed no evidence of the yellow substance (Ref.16, pp. 1, 2; Ref. 17, p.1). However, these events indicate that hazardous substances may have been migrating downstream from Source 1 after the culvert at Queeny Avenue was blocked.

As part of a consent decree between IEPA and Cerro Copper, Cerro Copper removed part of the contaminated sediment, soil, and water from Source 1 in 1990. Under IEPA oversight, a total of 27,500 tons of contaminated sediments were removed from Source 1 and disposed of at RCRA- and TSCA-regulated facilities (Ref. 4a, p. 4-12; Ref. 22, p. 5). Cerro Copper then backfilled the creek bed with clean material and covered it with gravel (Ref. 14, p. 2; Ref. 22, p. 10). Access to Source 1 is restricted by a fence surrounding the Cerro Copper property (Ref. 3a, p. 2-7). Currently, Source 1 is level and dry (Ref. 14, p. 1-1).

Before the culvert at Queeny Avenue was sealed, and possibly after, hazardous substances disposed of in Source 1 were available to migrate to the lower portions of Dead Creek. Given the well-documented and long-term contribution of this source to the contamination in Dead Creek, the history of Source 1 is a critical part of the evaluation of the Sauget Area 1 site.

Source Location:

Source 1 is located on property owned by Cerro Copper, extending from the Alton & Southern Railroad on the north to Queeny Avenue on the south. Source 1 is identified in Figure 2 and is visible in aerial photographs of the site (Ref. 7, p. 10; Ref. 11; Ref. 48).

Containment:

Release via overland migration or flood

While in operation, Source 1 did not have a maintained engineered cover or a functioning and maintained run-on control system and run-off management system (Ref. 4a, p. 4-12; Ref. 14, p. 2, 1-1). In addition, it is not documented that Source 1 was designed, constructed, operated, and maintained to prevent a washout of hazardous substances by flood. Therefore, hazardous substances in this source were available to the surface water migration pathway.

2.4.1 Hazardous Substances

Prior to the removal action in 1990, several sampling events indicated the presence of hazardous substances in the sediments of Source 1. A 1988 ESI conducted by IEPA included the collection of four sediment samples from CS-A. These samples indicated the presence of high concentrations of VOCs, SVOCs, PCBs, and metals (Ref. 3a, pp. 4-89 through 4-94). More than 30 sediment samples were collected for a 1990 investigation of CS-A by Cerro Copper (Ref. 6, p. 27). These samples also indicated the presence of VOCs, SVOCs, PCBs, and metals in Source 1 (Ref. 6, pp. 68-69, 85, 114-119).

2.4.2 Hazardous Waste Quantity

The removal action at Source 1 has reduced the quantity of hazardous waste present in the source. Information available at this time is insufficient to determine with reasonable confidence the quantity of any remaining hazardous substances in the area of the former impoundment or the quantity that has migrated from the source. Therefore, a source hazardous waste quantity for Source 1 will not be evaluated or included in the calculation of the hazardous waste quantity factor value for the surface water migration pathway. However, historical releases from Source 1 may have contributed to the contamination still present on site (Ref. 22, p. 5).

2.4.2.1.5 **Source Hazardous Waste Quantity Value**

NS

Source Hazardous Waste Quantity Value: NS

SOURCE DESCRIPTION

2.2 Source Characterization

Source Number: 2

Source Name (type): CS-B (surface impoundment)

Source 2 is an impoundment that extends for approximately 1,950 ft of Dead Creek from Queeny Avenue on the north to Judith Lane on the south and is located immediately downgradient of Source 1 (Figure 2; Ref. 4a, p. 4-93; Ref. 5, p. 1-2; Ref. 8). Source 2 was created from a segment of Dead Creek when the culverts at Queeny Avenue and Judith Lane (roads that cross Dead Creek) were sealed in response to area residents' concerns about hazardous substances in the upper portions of Dead Creek migrating to the lower portions of the creek (Ref. 5, p. 1-3). Aerial photographs indicate the culvert connecting Source 1 to Source 2 was first blocked some time between 1940 and 1950 (Ref. 11; Ref. 48; Figure 2). The culvert at Queeny Avenue was intended to be permanently sealed some time in the late 1960s to early 1970s (Ref. 5, p. 1-3; Ref. 22, p. 5). Based on aerial photographs it appears the culvert at the southern end of Source 2 (at Judith Lane) was first blocked between 1950 and 1962 (Ref. 11; Ref. 13, p. 19; Ref. 32; Figure 2). The 1962 aerial photograph shows Source 2 appearing wider and holding more water than downstream segments of the creek (Ref. 32; Figure 2). In this photograph, Source 2 is approximately 60 ft wide (Ref. 32). This culvert at Judith Lane was intended to be permanently sealed in the 1960s to 1970s (Ref. 5, p. 1-3; Ref. 22, p. 5).

Although culverts at both the north and south ends of Source 2 were supposedly sealed, IEPA reported observing water flowing downstream from Source 1 to Source 2 at Queeny Avenue according to a 1981 report (Ref. 13, p. 19). Additional reports to the Bureau of Water Pollution Control also indicate that the culvert at Queeny Avenue was not completely sealed. In March 1971, a Cahokia Health Officer and two Sauget area residents independently observed a yellow substance flowing from Source 1, through the Queeny Avenue culvert, to Source 2 (Ref. 16, pp. 1, 2; Ref. 17, p. 1). In 1981, water was also observed flowing from Source 2 to CS-C, the northern portion of Source 3 (Ref. 13, p. 19). Water flows downstream, past the Judith Lane culvert, when it reaches an undetermined level in Source 2 (Ref. 13, p. 19).

In addition to receiving flow from Source 1, Source 2 received waste from other operations along the creek. An outfall from Midwest Rubber Company (Midwest Rubber), a rubber reclaiming company, discharged into Source 2 from the late 1940s to the early 1960s (Ref. 13, p. 12; Ref. 22, p.13; Ref. 23, p. 3). Midwest Rubber had an 18-inch outfall located approximately 200 ft south of Queeny Avenue in Source 2 (Ref. 50, p. 1). According to IEPA, the creek bed downstream of this outfall is "rubberized" (Ref. 50, p.1).

Source 2 also received discharge from Waggoner Trucking Company (Waggoner) operations (Ref. 5, p. 1-4; Ref. 22, p.13). Waggoner discharged wash water used to clean industrial waste hauling trucks directly into Source 2. On August 6, 1971, Waggoner was ordered by IEPA to stop discharging to Source 2 (Ref. 59, p. 1). Shortly afterwards, Waggoner indicated that all discharges to Dead Creek had stopped and an impoundment (Source 7) had been constructed to contain the company's wash water (Ref. 13, pp. 12 and 13; Ref. 60, p. 1). According to a signed 1999 Consent Order between EPA, Monsanto, and Solutia, Monsanto/Solutia has also contributed to the wastes present in Source 2 (Ref. 22, p. 13).

Source 2 may also have received runoff from other Sauget Area 1 sources, such as Sources 1, 4, 5, and 7, which are located adjacent to Source 2 (Figure 2; Ref. 10, p. 13; Ref. 22, pp 3-5; Ref. 38, p.1). Before the culvert separating Source 1 and Source 2 was blocked, and possibly after, water from Source 1 flowed into Source 2 and subsequently to downstream portions of Dead Creek. Source 7, an impoundment for hazardous waste tanker truck wash water, was designed to overflow into Source 2 (Ref. 4a, p. 2-8).

Water levels in Source 2 vary considerably depending on area precipitation (Ref. 3a, pp. 2-8). During record precipitation levels in the area during the summer of 1993, the water level in Source 2 reached a maximum and was pumped out of Source 2 and discharged directly to the downstream portion of the creek (Source 3) without any treatment (Ref. 51, p. 1). At that time, IEPA personnel also observed that, as surface water in Source 2 rises, it becomes hydraulically connected with Source 4, which is adjacent to Source 2 to the west (Figure 2; Ref. 22, p. 4; Ref. 38, p. 1; Ref. 65, p. 2-1). The surface water from Source 2 was also observed flowing onto Queeny Avenue and Judith Lane (Ref. 38, p. 1).

During periods of low precipitation, Source 2 becomes completely dry, exposing the entire creek bed (Ref. 3a, p. 2-8). Local residents have reported periodic smoldering and glowing in the creek bed of

Source 2 (Ref. 47). In August 1980, a local resident's dog rolled in the dry creek bed of Source 2 and died of apparent resulting chemical burns (Ref. 13, p. 1). Subsequent sampling revealed elevated levels of phosphorus, heavy metals, and PCBs (Ref. 47; Ref. 13, p. 1). The results of this sampling prompted IEPA to restrict access to Source 2 and Area M (see discussion of Other Possible Sources following the source characterizations) in September 1980 by surrounding both with a snow fence (Ref. 13, p. 1; Ref. 3a, p. 2-57). In October 1982, EPA replaced the snow fence with an 8-foot, chain-link fence (Ref. 3a, p. 2-61). Sampling conducted in 1987 revealed elevated levels of organic and inorganic substances in Source 2 including PCBs (Ref. 3a, pp. 4-89 through 4-94). During site visits in the early 1990s, the banks of Source 2 were observed to be heavily vegetated and debris was scattered throughout the northern half of the source (Ref 14, pp. 1-3, 1-4; Ref. 24, p. 15).

Source Location:

Source 2 extends from Queeny Avenue on the north to Judith Lane on the south. Source 2 is identified in Figure 2 and is visible in aerial photographs of the site (Ref. 11; Ref. 32).

Containment:

Release via overland migration or flood

Source 2 does not have diking that is regularly inspected and maintained or any liner (Ref. 5, p. 1-2; Ref. 24, p. 15). In addition, Source 2 is not designed, constructed, operated, and maintained to prevent a washout of hazardous substances by flood (Ref. 4a, p. 2-8; Ref. 24, pp. 3, 15; Ref. 38, p. 1; Ref. 51, p. 1). Therefore, surface water overland flow and flood containment values of 10 are assigned (Ref. 1, Table 4-2, Table 4-8, pp. 51609, 51611).

2.4.1 Hazardous Substances

Ten sediment samples were collected from CS-B in January and February 2000 that were analyzed for "industry specific" constituents, including PCBs, copper, and zinc (Ref. 40a, pp. 173-179, App. B-5; Ref. 63, pp. 10-12). PCBs, copper, and zinc were detected at elevated concentrations in all ten of the samples. Analytical results from this sampling event document the presence of PCBs in Source 2 at concentrations as high as 24,290 μg/kg (FASED-CSB-S6), copper at concentrations as high as 19,000 mg/kg (FASED-CSB-S4W and FASED-CSB-S2), and zinc at concentrations as high as 26,000 mg/kg (FASED-CSB-S9W) (Ref. 40a, App. B-5; Ref. 63, pp. 10-12; Ref. 40b, pp. 83, 107).

In October 1999, Solutia also collected three vertically-integrated sediment core samples every 1,000 ft in Source 2 (Ref. 10, pp. 127, 129; Ref. 39, pp. 3-11; Ref. 40a, App. B-4). Samples were collected at a depth of 0.2 ft in depositional areas of the thickest profile (Ref. 10, p. 127; Ref. 39, pp. 3-11; Ref. 40a, App. B-4). Sample SED-CSB-S1 was collected from the northern portion of Source 2; SED-CSB-S2 was collected from the intermediate portion of the source; and SED-CSB-S3 was collected from the southern portion (Ref. 39, pp. 3-11). These samples were analyzed for VOCs, SVOCs, metals, PCBs, pesticides, herbicides, and dioxins/furans (Ref. 10, p. 130; Ref. 39, pp. 3-11; Ref. 40a, App. B-4). Although VOCs, SVOCs, pesticides, herbicides, and dioxins/furans were detected in the sediments of Source 2, only the analytical data for PCBs and metals detected in the three core samples are presented below (Ref. 39, pp. 3, 4, 6, 7; Ref. 40a, App. B-4).

Previous sampling events, including an ESI for IEPA in May 1988 and a 1992 investigation by Monsanto, have also indicated the presence of VOCs, SVOCs, PCBs, and metals in Source 2 sediments (Ref. 3a, pp. 7-22, 7-23; Ref. 3b, pp. 414-421; Ref. 5, pp. 2-1 through 2-3, 4-1 through 4-3; Ref. 10, pp. 14-15).

Metals are ubiquitous and naturally-occurring in soils and sediments. Although Source 2 is evaluated as a surface impoundment, the concentrations of metals detected in the Source 2 sediment samples are compared to background sediment concentrations. Four samples (SED-RA1-S1, SED-RA1-S2, SED-RA2-S1, SED-RA2-S2) were collected during the Solutia RI/FS from a watershed selected by Solutia as similar to that of Dead Creek to establish the background concentrations (Ref. 10, p. 129; Ref. 39, p.12). The TOC measured in the four background sediment samples is less than the TOC measured in the sediment samples collected from CS-B (Ref. 40a, App. B-4g; Ref. 40b, pp. 74, 80, 81). Higher concentrations of metals are typically associated with lower TOC measurements. Therefore, the concentrations of metals detected in the background samples may be considered a conservative representation of metals concentrations in sediments of the area. Only concentrations of metals significantly greater than the highest background concentration were considered associated with the source. The concentrations of PCBs are not compared to a background concentration as they are not ubiquitous or naturally-occurring, as illustrated by samples SED-RA1-S1, SED-RA1-S2, SED-RA2-S1, and SED-RA2-S2 (Ref. 40a, App. B-4e; Ref. 40b, pp. 29-32).

Background Concentrations

Hazardous Substance	**Background Concentration[3]**	**Sample ID**	**Quantitation Limit[2]**	**Reference**
Arsenic	8 mg/kg	SED-RA1-S1	1.78 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 51
Cadmium	0.65 J mg/kg	SED-RA2-S2	1.08 mg/kg	Ref. 40a, App. B-4f: Ref. 40b, p. 54
Chromium, total	25 J mg/kg	SED-RA2-S2	2.17 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 54
Copper	23 J mg/kg	SED-RA2-S2	4.53 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 54
Lead	23 J mg/kg	SED-RA1-S1	0.89 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 51
Mercury	0.063 mg/kg	SED-RA1-S2	0.05 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 52
Zinc	96 J mg/kg	SED-RA2-S2	4.35 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 54

Source Samples

SED-CSB-S1

Hazardous Substance	**Concentration[3]**	**Quantitation Limit[2]**	**Reference**
PCBs, total[1]	162,180 μg/kg	500 μg/kg	Ref. 39, p. 5; Ref. 40a, App. B-4e, App. C-4e; Ref. 40b, pp. 33, 100
Arsenic	35 J mg/kg	2.5 mg/kg	Ref. 39, p. 8; Ref. 40a, App. B-4f; Ref. 40b, p. 55
Cadmium	17 J mg/kg	1.25 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 55
Copper	5,100 J mg/kg	5.0 mg/kg	Ref. 39, p. 9; Ref. 40a, App. B-4f; Ref. 40b, p. 55

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
Lead	630 J mg/kg	1.25 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 55
Mercury	0.96 J mg/kg	0.25 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 55
Zinc	2,000 J mg/kg	5.0 mg/kg	Ref. 39, p. 11; Ref. 40a, App. B-4f; Ref. 40b, p. 55

<u>SED-CSB-S2</u>

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
PCBs, total[1]	226,140 μg/kg	500 μg/kg	Ref. 39, p. 5; Ref. 40a, App. B-4e, App. C-4e; Ref. 40b, p. 34, 100
Arsenic	38 J mg/kg	2.5 mg/kg	Ref. 39, p. 8; Ref. 40a, App. B-4f; Ref. 40b, p. 56
Cadmium	25 J mg/kg	1.25 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 56
Chromium, total	76 J mg/kg	2.5 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 56
Copper	11,000 J mg/kg	5.0 mg/kg	Ref. 39, p. 9; Ref. 40a, App. B-4f; Ref. 40b, p. 56
Lead	1,000 J mg/kg	1.25 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 56
Mercury	1.5 J mg/kg	0.25 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 56
Zinc	7,900 J mg/kg	5.0 mg/kg	Ref. 39, p. 11; Ref. 40a, App. B-4f; Ref. 40b, p. 56

SED-CSB-S3

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
PCBs, total[1]	67,700 μg/kg	670 μg/kg	Ref. 39, p. 5; Ref. 40a, App. B-4e, App. C-4e; Ref. 40b, pp. 35, 100
Arsenic	25 J mg/kg	3.33 mg/kg	Ref. 39, p. 8; Ref. 40a, App. B-4f; Ref. 40b, p. 57
Cadmium	25 J mg/kg	1.67 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 57
Chromium, total	78 J mg/kg	3.33 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 57
Copper	6,700 J mg/kg	6.67 mg/kg	Ref. 39, p. 9; Ref. 40a, App. B-4f; Ref. 40b, p. 57
Lead	750 J mg/kg	1.67 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 57
Mercury	1.4 J mg/kg	0.33 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 57
Zinc	4,800 J mg/kg	6.67 mg/kg	Ref. 39, p. 11; Ref. 40a, App. B-4f; Ref. 40b, p. 57

1 - The concentration presented for PCBs is the sum of the concentrations of PCB isomers detected in the sample. The quantitation limit presented is the reporting detection limit (corrected for percent solids, sample volume, and dilution) of the isomer with the lowest detected concentration in the samples. The reporting detection limits for each isomer are shown below:

Monochlorobiphenyl	3.33 μg/kg	Hexachlorobiphenyl	6.67 μg/kg
Dichlorobiphenyl	3.33 μg/kg	Heptachlorobiphenyl	10.00 μg/kg
Trichlorobiphenyl	3.33 μg/kg	Octachlorobiphenyl	10.00 μg/kg
Tetrachlorobiphenyl	6.67 μg/kg	Nonachlorobiphenyl	16.66 μg/kg
Pentachlorobiphenyl	6.67 μg/kg	Decachlorobiphenyl	16.66 μg/kg

2 - The quantitation limits presented for metals are the reporting detection limits corrected for percent solids of each sample. The reporting detection limit used by the laboratory analyzing the samples was calculated based on reported U-qualified concentrations of each analyte. These U-qualified concentrations were adjusted for sample volume to determine the reporting detection limit. The reporting detection limits for each analyte are shown below:

Arsenic	1.0 mg/kg	Lead	0.5 mg/kg
Cadmium	0.5 mg/kg	Mercury	0.02 mg/kg
Chromium	1.0 mg/kg	Zinc	2.0 mg/kg
Copper	2.0 mg/kg		

3 - A "J"-qualifier has been applied to the concentrations of metals due to the percentage solids in the samples being reported as less than 50 percent (Ref. 40a, pp. 199-200, App. B-4f). Additionally, the concentrations of copper, lead, and zinc also received a "J"-qualifier due to the detection of these analytes in the associated blank sample (Ref. 40a, pp. 200-202). A "J"-qualifier indicates that the analyte has been positively identified in the sample, but the concentration is estimated (Ref. 15, p. 6).

Hazardous substances associated with Source 2:

PCBs	Chromium	Mercury
Arsenic	Copper	Zinc
Cadmium	Lead	

2.4.2 Hazardous Waste Quantity

The HWQ for Source 2 is based on the area of the source.

2.4.2.1.1 Hazardous Constituent Quantity

Sufficient information is not available to evaluate the hazardous constituent quantity for Source 2.

Sum (pounds) (S): Unknown

Hazardous Constituent Quantity Value: NS

2.4.2.1.2 Hazardous Wastestream Quantity

Sufficient information is not available to evaluate the hazardous wastestream quantity for Source 2.

Sum (pounds) (W): Unknown

Hazardous Wastestream Quantity Value: NS

2.4.2.1.3 Volume

Sufficient information is not available to determine the depth of Source 2. For this reason, the volume of Source 2 cannot be determined and a value of zero is assigned (Ref. 1, Section 2.4.2.1.3, p.51591).

Dimension of source (yd^3 of gallons) (V): Unknown

Volume Assigned Value: 0

2.4.2.1.4 Area

As measured in a 1992 SI by Monsanto, Source 2 extends for approximately 1,950 ft of Dead Creek from Queeny Avenue on the north to Judith Lane on the south (Ref. 5, p. 1-2). The length of Source 2 in a 1962 aerial photograph was 2.80 inches (Ref. 32). Because the length of Source 2 has been measured to be 1,950 ft, the scale used for the 1962 aerial photograph was 2.80 inches equals 1,950 ft (Ref. 5, p. 1-2; Ref. 32). A ruler was used to measure the width of Source 2 from the same 1962 aerial photograph. In this photograph the average width of Source 2 was 0.08 inches (Ref. 32). The width of Source 2 is calculated as follows:

0.08 in x 1,950 ft/2.80 in = 55.71 ft

The area of Source 2 is calculated as follows:

1,950 ft x 55.71 ft = 108,634.5 ft^2

A waste quantity divisor of 13 for surface impoundment is used to calculate the area assigned value as follows (Ref. 1, Table 2-5, p. 51591):

108,634.5/13 = 8,356.5

Area of source (ft^2) (A): 108,634.5
Reference(s): 5, p. 1-2; 32
Area Assigned Value: 8,356.5

2.4.2.1.5 Source Hazardous Waste Quantity Value

The HWQ was determined using the area of Source 2. The assigned value for the source was then determined using HRS Table 2-5 (Ref. 1, p. 51591).

Source Hazardous Waste Quantity Value: 8,356.5

SOURCE DESCRIPTION

2.2 Source Characterization

Source Number: 3

Source Name (type): CS-C, CS-D, CS-E, and CS-F to the PPE (contaminated soil)

Source 3 is the contaminated soil lining Dead Creek downstream of Source 2 from the beginning of CS-C to the PPE into the perennial wetland along CS-F (Figure 2). This soil has become contaminated by the migration of hazardous substances and is, therefore, considered a source itself (Ref. 1, Section 1.1, p. 51587). Although it has been represented as a perennial stream on the USGS map, this portion of Dead Creek is intermittent, as shown by photographs taken by IEPA (Ref. 8; Ref. 3a, p. 2-8; Ref. 24, pp. 17, 18). The farthest downgradient sample showing contamination in the intermittent portion of Dead Creek is FASED-CSF-S28 (Ref. 63, pp. 10-12). This sample was collected immediately upgradient of the PPE into the wetland. CS-C extends for approximately 1,300 ft from Judith Lane to Cahokia Street. CS-D extends for approximately 1,100 ft from Cahokia Street to Jerome Lane. CS-E extends for approximately 4,300 ft from Jerome Lane to the intersection of Route 3 and Route 157 (Ref. 10, p. 13; Ref. 22, pp. 5-6). Based on the scale provided on the sample location maps provided by Solutia, approximately 1,800 ft of CS-F is located between the intersection of Route 3 and Route 57 and the PPE into the wetland (Ref. 10, p. 13; Ref. 22, p. 6; Ref. 39, pp. 3-11; Ref. 63, pp. 10-12). Therefore, Source 3 extends for a total length of approximately 8,500 ft.

CS-C, CS-D, CS-E, and the intermittent portion of CS-F are located in residential areas of Sauget and Cahokia (Ref. 8; Ref. 10, p.13; Ref. 14, pp. 1, 4; Ref. 22, pp. 5-6). Because of surface topography and the lack of adequate containment for the other Sauget Area 1 sources, CS-C, CS-D, CS-E, and the intermittent portion of CS-F have received hazardous substances through runoff from upstream Sauget Area 1 sources (Ref. 8; Ref. 18; Figure 2). Although culverts located at the southern ends of both Sources 1 and 2 may have been blocked, water has been observed flowing downstream past both these culverts (Ref. 11; Ref. 12; Ref. 13, p. 19; Ref. 16, pp. 1, 2; Ref. 17, p. 1; Ref. 65, p. 2-1). The banks of CS-C through CS-F are well vegetated (Ref. 14, pp. 1-5 through 1-10). Several residences and Parks College border Source 3 (Ref. 8; Ref. 10, p. 13). Access to Source 3 is not restricted and children have been observed walking in the creek bed (Ref. 14, p. 1-5 through 1-10; Ref. 24, p. 17).

<u>**Source Location:**</u>

Source 3 extends for approximately 8,500 ft from the end of Source 2 through Dead Creek segments CS-C, CS-D, CS-E, and a portion of CS-F. The location of Source 3 is identified in Figure 2 and is visible in aerial photographs of the site (Ref. 18).

<u>**Containment:**</u>

Release via overland migration or flood

Source 3 does not have a maintained engineered cover or a functioning and maintained run-on control system and run-off management system (Ref. 14, pp. 1-5 through 1-9; Ref. 24, pp. 15-18). In addition, Source 3 was not designed, constructed, operated, and maintained to prevent a washout of hazardous substances by flood (Ref. 24, pp. 15-18; Ref. 38, p. 1; Ref. 51, p. 1). Therefore, surface water overland flow and flood containment values of 10 are assigned (Ref. 1, Table 4-2, Table 4-8, pp. 51609, 51611).

2.4.1 <u>Hazardous Substances</u>

In October 1999, Solutia conducted a sampling event at Source 3 for an RI/FS (Ref. 40a, App. B-4). Sixty samples were collected from Source 3 in January and February 2000 that were analyzed for "industry specific" constituents, including PCBs, copper, and zinc (Ref. 40a, pp. 121-124, App. B-5; Ref. 63, pp. 10-12). Analytical results from this sampling event document the presence of PCBs in Source 3 at concentrations as high as 48,250 μg/kg (FASED-CSC-S12E), copper at concentrations as high as 35,000 mg/kg (FASED-CSE-S7W), and zinc at concentrations as high as 150,000 mg/kg (FASED-CSE-S15) (Ref. 40a, App. B-5; Ref. 63, pp. 10-12; Ref. 40b, pp. 84, 108). The farthest downgradient sample collected in Source 3 is FASED-CSF-S28, which was collected immediately upgradient of the PPE. The analytical data for this sample are presented below.

Solutia also collected nine vertically-integrated core samples in Source 3; three from CS-C, three from CS-D, and three from CS-E (Ref. 10, pp. 127, 129; Ref. 39, pp. 3-11). The core samples collected from CS-F were collected from the wetland area and are discussed in the observed release section of this document (Section 4.1.2.1.1). Samples were collected at a depth of 0.2 ft in depositional areas of the thickest profile (Ref. 10, p. 127; Ref. 39, pp. 3-11; Ref. 40a, App. B-4). These samples were analyzed for VOCs, SVOCs, metals, PCBs, pesticides, herbicides, and dioxins/furans (Ref. 10, p. 130; Ref. 39, pp. 3-11; Ref. 40a, App. B-4). Although VOCs, SVOCs, pesticides, herbicides, and dioxins/furans were also detected in Source 3, only the analytical data for PCBs and metals are presented below (Ref. 39, pp. 3, 4, 6, 7; Ref. 40a, App. B-4).

Previous sampling events conducted at Source 3, including a 1988 ESI and a 1991 SSI, have also indicated the presence of VOCs, SVOCs, PCBs, pesticides, and metals (Ref. 4b, pp. 4, 5, 87-116; Ref. 10, pp. 13, 15).

Metals are ubiquitous and naturally-occurring in soils and sediments. For this reason, the concentrations of metals detected in the Source 3 samples are compared to background concentrations. Four samples (SED-RA1-S1, SED-RA1-S2, SED-RA2-S1, SED-RA2-S2) were collected during the Solutia RI/FS from a watershed selected by Solutia as comparable with that of Dead Creek in order to establish the background concentrations (Ref. 10, p. 129; Ref. 39, p.12). The TOC measured in the background samples is less than the TOC measured in the samples collected from CS-C, CS-D, and CS-E (Ref. 40a, App. B-4g; Ref. 40b, pp. 75-78, 80, 81). In general, higher concentrations of metals are typically associated with lower TOC measurements. Therefore, the concentrations of metals detected in the background samples may be considered a conservative representation of metals concentrations in the area. Only concentrations of metals significantly greater than the highest background concentration were considered associated with the source. The concentrations of PCBs do not need to be compared to a background concentration as they are man-made and not naturally-occurring, as illustrated by samples SED-RA1-S1, SED-RA1-S2, SED-RA2-S1, and SED-RA2-S2 (Ref. 40a, App. B-4e; Ref. 40b, pp. 29-32).

Background Concentrations

Hazardous Substance	**Background Concentration[3]**	**Sample ID**	**Quantitation Limit[2]**	**Reference**
Arsenic	8 mg/kg	SED-RA1-S1	1.78 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 51
Cadmium	0.65 J mg/kg	SED-RA2-S2	1.08 mg/kg	Ref. 40a, App. B-4f: Ref. 40b, p. 54
Chromium, total	25 J mg/kg	SED-RA2-S2	2.17 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 54

Hazardous Substance	Background Concentration[3]	Sample ID	Quantitation Limit[2]	Reference
Copper	23 J mg/kg	SED-RA2-S2	4.35 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 54
Lead	23 J mg/kg	SED-RA1-S1	0.89 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 51
Mercury	0.063 mg/kg	SED-RA1-S2	0.05 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 52
Zinc	96 J mg/kg	SED-RA2-S2	4.35 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 54

Source Samples

SED-CSC-S1

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
PCBs, total[1]	160 μg/kg	110 μg/kg	Ref. 39, p. 5; Ref. 40a, App. B-4e, App. C-4e; Ref. 40b, pp. 36, 100
Arsenic	28 J mg/kg	3.44 mg/kg	Ref. 39, p. 8; Ref. 40a, App. B-4f; Ref. 40b, p. 58
Cadmium	20 J mg/kg	1.72 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 58
Copper	1,400 J mg/kg	6.90 mg/kg	Ref. 39, p. 9; Ref. 40a, App. B-4f; Ref. 40b, p. 58
Lead	270 J mg/kg	1.72 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 58
Mercury	0.66 J mg/kg	0.07 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 58
Zinc	2,900 J mg/kg	6.90 mg/kg	Ref. 39, p. 11; Ref. 40a, App. B-4f; Ref. 40b, p. 58

SED-CSC-S2

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
PCBs, total[1]	2,920 μg/kg	1,200 μg/kg	Ref. 39, p. 5; Ref. 40a, App. B-4e, App. C-4e; Ref. 40b, pp. 37, 101
Cadmium	19 J mg/kg	1.42 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 59
Chromium, total	93 J mg/kg	2.86 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 59
Copper	2,200 J mg/kg	5.71 mg/kg	Ref. 39, p. 9; Ref. 40a, App. B-4f; Ref. 40b, p. 59
Lead	330 J mg/kg	1.42 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 59
Mercury	0.64 J mg/kg	0.06 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 59
Zinc	4,500 J mg/kg[3]	5.71 mg/kg	Ref. 39, p. 11; Ref. 40a. App. B-4; Ref. 40b, p. 59

SED-CSC-S3

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
PCBs, total[1]	4,600 μg/kg	1,600 μg/kg	Ref. 39, p. 5; Ref. 40a, App. B-4e, App. C-4e; Ref. 40b, pp. 38, 101
Cadmium	16 J mg/kg	1.92 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 60
Copper	2,100 J mg/kg	7.69 mg/kg	Ref. 39, p. 9; Ref. 40a, App. B-4f; Ref. 40b, p. 60
Lead	480 J mg/kg	1.92 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 60

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
Mercury	0.58 J mg/kg	0.08 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 60
Zinc	3,300 J mg/kg	7.69 mg/kg	Ref. 39, p. 11; Ref. 40a, App. B-4f; Ref. 40b, p. 60

<u>SED-CSD-S1</u>

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
PCBs, total[1]	697 μg/kg	180 μg/kg	Ref. 39, p. 5; Ref. 40a, App. B-4e, App. C-4e;Ref. 40b, pp. 39, 101
Cadmium	15 J mg/kg	2.17 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 61
Copper	740 J mg/kg	8.69 mg/kg	Ref. 39, p. 9; Ref. 40a, App. B-4f; Ref. 40b, p. 61
Lead	260 J mg/kg	2.17 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 61
Mercury	0.5 J mg/kg	0.09 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 61
Zinc	2,500 J mg/kg	8.69 mg/kg	Ref. 39, p. 11; Ref. 40a, App. B-4f; Ref. 40b, p. 61

<u>SED-CSD-S2</u>

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
PCBs, total[1]	1,150 μg/kg	190 μg/kg	Ref. 39, p. 5; Ref. 40a, App. B4e, App. C-4e; Ref. 40b, pp. 40, 101

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
Cadmium	13 J mg/kg	2.38 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 62
Copper	730 J mg/kg	9.52 mg/kg	Ref. 39, p. 9; Ref. 40a, App. B-4f; Ref. 40b, p. 62
Lead	230 J mg/kg	2.38 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 62
Mercury	0.42 J mg/kg	0.10 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 62
Zinc	2,700 J mg/kg	9.52 mg/kg	Ref. 39, p. 11; Ref. 40a, App. B-4f; Ref. 40b, p. 62

SED- CSD-S3

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
PCBs, total[1]	730 μg/kg	120 μg/kg	Ref. 39, p. 5; Ref. 40a, App. B-4e, App. C-4e; Ref. 40b, pp. 41, 101
Cadmium	10 J mg/kg	1.47 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 63
Copper	320 J mg/kg	5.88 mg/kg	Ref. 39, p. 9; Ref. 40a, App. B-4f; Ref. 40b, p. 63
Lead	170 J mg/kg	1.47 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 63
Mercury	0.35 J mg/kg	0.06 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 63
Zinc	1,800 J mg/kg	5.88 mg/kg	Ref. 39, p. 11; Ref. 40a, App. B-4f; Ref. 40b, p. 63

SED-CSE-S1

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
PCBs, total[1]	1,038.2 μg/kg	12 μg/kg	Ref. 39, p. 5; Ref. 40a, App. B-4e, App. C-4e; Ref. 40b, pp. 42, 101
Cadmium	14 J mg/kg	1.79 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 64
Copper	570 J mg/kg	7.14 mg/kg	Ref. 39, p. 9; Ref. 40a, App. B-4f; Ref. 40b, p. 64
Lead	310 J mg/kg	1.79 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 64
Mercury	0.51 J mg/kg	0.07 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 64
Zinc	2,300 J mg/kg	7.14 mg/kg	Ref. 39, p. 11; Ref. 40a, App. B-4f; Ref. 40b, p. 64

SED-CSE-S2

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
Cadmium	11 J mg/kg	1.32 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 65
Copper	350 J mg/kg	5.26 mg/kg	Ref. 39, p. 9; Ref. 40a, App. B-4f; Ref. 40b, p. 65
Lead	190 J mg/kg	1.32 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 65
Mercury	0.3 J mg/kg	0.05 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 65
Zinc	1,800 J mg/kg	5.26 mg/kg	Ref. 39, p. 11; Ref. 40a, App. B-4f; Ref. 40b, p. 65

SED-CSE-S3

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
Cadmium	7.7 J mg/kg	1.67 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 66
Copper	150 J mg/kg	6.67 mg/kg	Ref. 39, p. 9; Ref. 40a, App. B-4f; Ref. 40b, p. 66
Lead	140 J mg/kg	1.67 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 66
Mercury	0.3 J mg/kg	0.07 mg/kg	Ref. 40a, App. B-4f; Ref. 40b, p. 66
Zinc	980 J mg/kg	6.67 mg/kg	Ref. 39, p. 11; Ref. 40a, App. B-4f; Ref. 40b, p. 66

FASED-CSF-S28

Hazardous Substance	Concentration	Quantitation Limit	Reference
PCBs, total[1]	6,290 μg/kg	120 μg/kg	Ref. 40a, App. B-5a; Ref. 63, p. 10; Ref. 40b, pp. 86, 109
Copper	1,200 mg/kg	unknown[4]	Ref. 63, p. 11
Zinc	3,200 mg/kg	unknown[4]	Ref. 63, p. 12

1 - The concentration presented for PCBs is the sum of the concentrations of PCB isomers detected in the sample. The quantitation limit presented is the reporting detection limit (corrected for percent solids, sample volume, and dilution) of the isomer with the lowest detected concentration in the samples. The reporting detection limits for each isomer are given in the hazardous substances section of the Source 2 characterization (Section 2.4.1).

2 - The quantitation limits presented for metals are the reporting detection limits corrected for percent solids of each sample. The reporting detection limit used by the laboratory analyzing the samples was calculated based on reported U-qualified concentrations of each analyte. These U-qualified concentrations were adjusted for sample volume to determine the reporting detection limit. The reporting detection limits for each analyte are given in the hazardous substances section of the Source 2 characterization (Section 2.4.1).

3 - A "J"-qualifier has been applied to the concentrations of metals due to the percentage solids in the samples being reported as less than 50 percent (Ref. 40a, pp. 199-200, App. B-4f). Additionally, the concentrations of copper, lead, and zinc also received a "J"-qualifier due to the detection of these analytes in the associated blank sample (Ref. 40a, pp. 200-202). A "J"-qualifier indicates that the analyte has been positively identified in the sample, but the concentration is estimated (Ref. 15, p. 6).

4 - The validated laboratory sample result forms for metal concentrations detected in the industry-specific analysis of Dead Creek sediments were not submitted by Solutia with the Data Validation Report for this sampling event (Ref. 40a). Therefore, there is insufficient information to determine the appropriate quantitation limit for the metal concentrations detected in sample FASED-CSF-S28. However, the data were subject to a QA/QC review equivalent to CLP program analyses and, if the concentrations were below the reporting detection limit, they would have been qualified as such.

Hazardous substances associated with Source 3:

PCBs	Copper
Arsenic	Lead
Cadmium	Mercury
Chromium	Zinc

2.4.2 Hazardous Waste Quantity

Although sampling data document that there is a quantity of hazardous waste present throughout the length of Source 3, the sampling is not sufficient to determine an area of the contaminated soil (Ref. 63, pp. 10-12). Therefore, the quantity of hazardous waste is conservatively estimated to be greater than zero.

2.4.2.1.1 Hazardous Constituent Quantity

Sufficient information is not available to evaluate the hazardous constituent quantity for Source 3.

Sum (pounds) (S): Unknown

Hazardous Constituent Quantity Value: NS

2.4.2.1.2 Hazardous Wastestream Quantity

Sufficient information is not available to evaluate the hazardous wastestream quantity for Source 3.

Sum (pounds) (W): Unknown

Hazardous Wastestream Quantity Value: NS

2.4.2.1.3 Volume

Sufficient information is not available to determine the depth of the contaminated soil. For this reason, the volume of Source 3 cannot be determined and a value of zero is assigned (Ref. 1, Section 2.4.2.1.3, p. 51591).

Dimension of source (yd^3 or gallons) (V): Unknown
Volume Assigned Value: 0

2.4.2.1.4 Area

There is currently insufficient information to reasonably delineate the area of contaminated soil. However, based on the contamination detected in 69 samples collected from Source 3, sampling data document that there is a quantity of hazardous waste present in Source 3 (Ref. 40a, App. B-4e, App, B4f, App. C-4e, App. B-5; Ref. 63, pp. 10-12). Therefore, the area measurement is assigned a value of greater than zero.

Area of source (ft^2) (A): NE
Reference(s): NA
Area Assigned Value: >0

2.4.2.1.5 Source Hazardous Waste Quantity Value

The HWQ for Source 3 is based on the area measurement of the source.

Source Hazardous Waste Quantity Value: >0

SOURCE DESCRIPTION

2.2 Source Characterization

Source Number: 4

Source Name (type): G (landfill)

Source 4 is a former landfill occupying approximately 5 acres (Figure 2; Ref. 3a, p. 2-5; Ref. 22, p. 3; Ref. 68, pp. 2, 6). While the landfill currently has a temporary soil cover, Source 4 was described during a 1988 ESI for IEPA as having fly ash and cinder material as cover, but exposed demolition debris and metal wastes were present over most of Source 4. Two small pits filled with oily, tar-like wastes and corroded drums were located on the eastern portion of the landfill (Ref. 22, p. 8; Ref. 68, p. 6). Deteriorated drums were scattered or partially buried along the southern and western portions of Source 4 (Ref. 3a, p. 2-5; Ref. 68, p. 6). During a 1993 site visit, stressed vegetation, rolls of asbestos, and pools of oil were observed at Source 4 (Ref. 14, p. 2). Source 4 is at a higher elevation and slopes toward Source 2 (Ref. 3a, p. 3-17 and Ref. 5, Figure 1-2). Drainage from Source 4 is generally toward segment CS-B of Dead Creek (Source 2) (Ref. 7, p. 10; Ref. 10, p. 3). Source 4 is adjacent to Dead Creek and, as water in the creek rises, Source 4 becomes hydraulically connected with surface water in the creek (Ref. 38, p. 1). Therefore, hazardous substances from this source may leach or flood into Dead Creek segment CS-B and, subsequently, to downstream areas (Ref. 22, p. 4; Ref. 38, p. 1).

Source 4 was operated as a landfill from approximately 1952 until 1973 with intermittent dumping occurring from 1966 until 1988 (Ref. 3a, p. 2-67; Ref. 22, pp.3, 8). Aerial photographs from 1955, 1962, and 1968 confirm that disposal activities were conducted during those years (Ref. 12; Ref. 32; Ref. 33). On November 25, 1969, an inspection of Source 4 by a St. Clair County sanitary inspector noted open dumping of chemicals, demolition materials, scrap lumber and metal, and paper (Ref. 56). While IEPA was considering cleanup activities for Area G in 1984, IEPA received an anonymous phone call indicating that excavation of the source would be dangerous due to the presence of buried toxic waste (Ref. 3a, p. 2-64). On several occasions, wastes located on the surface and/or in the subsurface of the source have spontaneously combusted and burned for long periods of time (Ref. 22, p.3; Ref. 68, pp. 6, 7). According to a signed 1999 Consent Order between EPA, Monsanto, and Solutia, Monsanto/Solutia has also contributed to the wastes present in Source 4 (Ref. 22, p. 13).

A field immediately south of Source 4 has been farmed for soybeans and wheat (Ref. 4a, p. 4-1; Ref. 14, pp. 3, 1-4). Due to concerns about runoff from Source 4 impacting the field, soybeans grown in the field were analyzed prior to 1993. This analysis indicated the presence of low levels of PCBs in the soybeans (Ref. 14, p. 3).

In May 1987, under the supervision of EPA and pursuant to an EPA removal action, Monsanto, Cerro Copper, and Wiese Engineering constructed a chain-link fence around Source 4 to restrict access (Ref. 3a, pp. 2-5, 2-65; Ref. 14, p. 1-3; Ref. 22, p. 3, Ref. 68, p. 6). A second EPA removal action at Source 4 was conducted in 1995 (Ref. 68). This removal action included the excavation of contaminated soils on and around the source, the solidification of open oil pits, the installation of shallow barrier wall. A clean soil cover 18 to 30 inches thick was placed over part of the source and the excavated contaminated soil (Ref. 10, p. 7; Ref. 22, pp. 3-4; Ref. 68, p. 2). This removal action only involved the consolidation of wastes and did not include the physical removal of any waste from the source area and is not considered a permanent remedy.

Source Location:

Source 4 is located adjacent to the west bank of Source 2. Source 4 is bordered to the north by Queeny Avenue, to the west by Wiese Engineering Company, to the south by a cultivated field, and to the east by Source 2 (Ref. 3a, p. 2-5; Ref.14, p.1-4; Ref. 68, p. 6). Source 4 is identified in Figure 2 and is visible in aerial photographs of the site (Ref. 12; Ref. 32, Ref. 33; Ref. 34).

Containment:

Release via overland migration or flood

The soil cover placed over part of Source 4 in 1995 is not a maintained engineered cover for HRS purposes. It is not a vegetated cover, is not designed to minimize the migration of free liquids, and does not constitute a cap. Furthermore, the soil was intended only as an interim cover. Source 4 also does not have a functioning and maintained run-on control system and run-off management system (Ref. 3a, p. 2-5; Ref. 14, p. 1-3). In addition, Source 4 was not designed, constructed, operated, and maintained to prevent the washout of hazardous substances by flood (Ref. 38, p. 1). Therefore, surface water overland flow and flood containment values of 10 are assigned (Ref. 1, Table 4-2, Table 4-8, pp. 51609, 51611).

2.4.1 Hazardous Substances

In October 1999, Solutia installed four borings at Source 4 for an RI/FS (Ref. 10, p. 40; Ref. 40a, App. B-1). A discrete surface sample was collected at each boring location at a depth of 0-0.5 ft bgs (Ref. 10, p. 40; Ref. 40a, App. B-1). While these samples may have been collected from the cover material placed over part of the source in 1995, they clearly show hazardous substances are present in the source. The samples were analyzed for VOCs, SVOCs, metals, PCBs, pesticides, herbicides, and dioxins/furans (Ref. 10, pp. 41-42; Ref. 40a, App. B-1). Pesticides and dioxins/furans were also detected in the Source 4 samples in 1999. Only the analytical data for PCBs and metals have been presented below and are used in this HRS evaluation (Ref. 40a, App. B-1). These samples consisted of material placed in Source 4, not native soil. Therefore, the hazardous substance concentrations in these samples do not need to be compared to a background concentration.

Samples collected during the assessment phase of the 1995 removal indicated levels of PCBs at 15,000 ppm (Ref. 68, p. 2). In addition, analytical data collected prior to the removal action indicated the presence of hazardous substances in Source 4. A 1988 ESI conducted by IEPA included the collection of 43 surface soil samples and 12 subsurface soil samples from Source 4. These samples indicated the presence of VOCs, SVOCs, PCBs, pesticides, and metals (Ref. 3b, pp. 423 through 441, 442 through 469). According to a signed 1999 Consent Order between EPA, Monsanto, and Solutia, soils in Source 4 contained elevated levels of VOCs, SVOCs, pesticides, PCBs, dioxins, and metals (Ref. 22, p. 8). The Consent Order further indicated that waste samples from Source 4 contained PCB levels as high as 3,000,000 ppb and dioxin levels in excess of 50,661 ppb (Ref. 22, p. 8).

Waste-G-B1

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
Copper	190 J mg/kg	2.38 mg/kg	Ref. 40a, App. B-1f; Ref. 63, p. 6; Ref. 40b, p.11

Waste-G-B2

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
PCBs, total[1]	7.9 μg/kg	7.8 μg/kg	Ref. 40a, App. B-1e, App. C-1e; Ref. 63, p. 3; Ref. 40b, p. 2
Copper	200 J mg/kg	2.33 mg/kg	Ref. 40a, App. B-1f; Ref. 63, p. 6; Ref. 40b, p. 12

Waste-G-B3

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
Copper	140 J mg/kg	2.22 mg/kg	Ref. 40a, App. B-1f; Ref. 63, p. 6; Ref. 40b, p. 13

Waste-G-B4

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
Copper	100 J mg/kg	2.20 mg/kg	Ref. 40a, App. B-1f; Ref. 63, p. 6; Ref. 40b, p. 14

1 - The concentration presented for PCBs is the sum of the concentrations of PCB isomers detected in the sample. The quantitation limit presented is the reporting detection limit (corrected for percent solids, sample volume, and dilution) of the isomer with the lowest detected concentration in the samples. The reporting detection limits for each isomer are given in the hazardous substances section of the Source 2 characterization (Section 2.4.1).

2 - The quantitation limits presented for metals are the reporting detection limits corrected for percent solids of each sample. The reporting detection limit used by the laboratory analyzing the samples was calculated based on reported U-qualified concentrations of each analyte. These U-qualified concentrations were adjusted for sample volume to determine the reporting detection limit. The reporting detection limits for each analyte are given in the hazardous substances section of the Source 2 characterization (Section 2.4.1).

3 - A "J"-qualifier has been applied to the concentrations of copper due to field duplicate excursions (Ref. 40a, p. 61, App. B-1f). A "J"-qualifier indicates that the analyte has been positively identified in the sample, but the concentration is estimated (Ref. 15, p. 6).

Hazardous substances associated with Source 4:

PCBs
Copper

2.4.2 Hazardous Waste Quantity

The removal action at Source 4 has not reduced the quantity of hazardous waste present in the source. The HWQ for Source 4 is based on the area of the source.

2.4.2.1.1 Hazardous Constituent Quantity

Sufficient information is not available to evaluate the hazardous constituent quantity for Source 4.

Sum (pounds) (S): Unknown
Hazardous Constituent Quantity Value: NS

2.4.2.1.2 Hazardous Wastestream Quantity

Sufficient information is not available to evaluate the hazardous wastestream quantity for Source 4.

Sum (pounds) (W): Unknown
Hazardous Wastestream Quantity Value: NS

2.4.2.1.3 Volume

According to a signed 1999 Consent Order between EPA, Monsanto, and Solutia, the volume of waste in Source 4 is estimated to be 60,000 cubic yards (Ref. 22, p. 8). A waste quantity divisor of 2,500 for a landfill is used to calculate the volume assigned value as follows (Ref. 1, Table 2-5, p. 51591):

60,000/2,500 = 24

Dimension of source (yd^3 or gallons) (V): 60,000 yd^3
Volume Assigned Value: 24

2.4.2.1.4 Area

The volume of Source 4 has been determined, therefore the area measure is assigned a value of zero (Ref. 1, Section 2.4.2.1.3, p. 51591).

Area of source (ft^2) (A): NS

Reference(s): NA

Area Assigned Value: 0

2.4.2.1.5 Source Hazardous Waste Quantity Value

The HWQ was determined using the volume of wastes in Source 4. The assigned value for the source was then determined using HRS Table 2-5 (Ref. 1, p. 51591).

Source Hazardous Waste Quantity Value: 24

SOURCE DESCRIPTION

2.2 Source Characterization

Source Number: 5

Source Name (type): H (landfill)

Source 5 is a landfill approximately 5 to 7 acres in size (Figure 2; Ref. 3a, p. 2-5; Ref. 22, p. 3). Prior to use as a landfill, this area consisted of a series of sand and gravel pits (Ref. 4a, p.4-3). These pits connected Source 5 and Source 6 (an adjacent landfill) until Queeny Avenue was built. Evidence indicates that Source 5 and Source 6 may still be physically continuous underneath Queeny Avenue (Ref. 4a, p. 4-3; Ref. 10, pp. 8, 9; Ref. 22, pp. 3, 7). Sources 5 and 6 are not evaluated as a single source in this HRS documentation package based on the historic delineation of these sources as separate landfills. [Note that the evaluation of these landfills as separate sources does not impact the hazardous waste quantity factor value.]

Aerial photographs show operations prior to 1936 and indicate disposal activities from 1950 to 1955 (Ref. 4a, p. 4-3; Ref. 11; Ref. 12). Additional aerial photographs from 1968 and 1974 show more limited disposal activities at Source 5 and, subsequently, an aerial photograph from 1980 indicates more extensive disposal activities (Ref. 7, p. 10; Ref. 33; Ref. 34). The southern portion of Source 5 is located in the Third Subdivision of Commons of Cahokia (Ref. 58, pp. 113, 114).

In Notifications of Hazardous Waste Site dated 1981, Monsanto indicated that it disposed of general chemical wastes from its Krummrich plant in Sauget and its Queeny Plant in St. Louis in a landfill along Falling Springs Road until 1957 (Ref. 61, p. 1; Ref. 62, p. 1). Sources 5 and 6 are the only known landfills located on Falling Springs Road. This 'Sauget-Monsanto Landfill', of which Source 5 is known to be a part, was in operation from 1931 until 1957 (Ref. 22, pp. 3, 12; Ref. 4a, p. 4-3). Source 5 received chemical waste including drums of solvents, other organics and inorganics (including PCBs), and municipal waste (Ref. 22, p. 7). After 1957, Monsanto began disposing of process wastes in a landfill located along the Mississippi River. Many of the wastes or waste types, including chlorobenzene, chlorophenols, nitroanilines, and miscellaneous solvents that Monsanto acknowledges were disposed of in its landfill along the river have also been detected in Source 5 (Ref. 57, pp. 1, 2).

IEPA collected eight soil borings across the source for a 1992 SSI (Ref. 4a, p.4-3). These borings indicated that the entire area has been altered due to disposal activities. The depth of fill material ranged from 2.5 to 13 ft bgs. Six of the eight borings showed waste material below the fill that was described as multi-colored sludges, solids, and oily refuse (Ref. 4a, p. 4-5). This waste material was 20 ft thick in the center of the source and was located below the water table (Ref. 4a, p. 4-5). Drainage from the source is generally west toward Dead Creek (CS-B) except in areas of depression that may collect runoff (Ref. 4a, p. 4-5; Ref. 10, p. 4; Ref. 11). Source 5 is grass-covered with areas of exposed slag and access is not restricted (Ref. 3a, p. 2-5; Ref. 14, p. 1-2; Ref. 22, p. 3).

Source Location:

Source 5 is located south of Queeny Avenue and may be physically continuous with Source 6 underneath Queeny Avenue. Source 5 is bordered to the north by Queeny Avenue, to the east by Falling Springs Road, and to the south and west by Metro Construction Company. Source 5 is identified in Figure 2 and is visible in aerial photographs of the site (Ref. 11; Ref. 12; Ref. 32; Ref. 33; Ref. 34).

Containment:

Release via overland migration or flood

Source 5 does not have a maintained engineered cover or a functioning and maintained run-on control system and run-off management system (Ref. 14, p. 1-2; Ref. 22, p. 3). In addition, it is not documented that Source 5 is designed, constructed, operated, and maintained to prevent the washout of hazardous substances by flood. Therefore, surface water overland flow and flood containment values of 10 are assigned (Ref. 1, Table 4-2, Table 4-8, pp. 51609, 51611).

2.4.1 Hazardous Substances

In September 1999, Solutia installed four borings at Source 5 for an RI/FS (Ref. 10, p. 40; Ref. 40a, App. B-1). A discrete sample of waste material was collected at each boring location at a depth of 0-0.5 ft bgs (Ref. 10, p. 40; Ref. 40a, App. B-1). These samples were analyzed for VOCs, SVOCs, metals, PCBs, pesticides, herbicides, and dioxins/furans (Ref. 10, pp. 41-42; Ref. 40a, App. B-1). Although SVOCs, pesticides, and dioxins/furans were detected in the Source 5 samples, only the analytical data for PCBs and metals have been presented below and are used in this HRS evaluation (Ref. 40a, App. B-1). These samples consisted of waste material, not native soil. Therefore, the hazardous substance concentrations in these samples do not need to be compared to a background concentration.

In addition, a 1988 ESI conducted by IEPA included the collection of eleven subsurface samples from Source 5. Analysis of these samples also indicated the presence of VOCs, SVOCs, PCBs, pesticides, and metals (Ref. 3a, pp. 3-21, 3-32; Ref. 3b, pp. 443-471).

Waste-H-B1

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
PCBs, total[1]	1,519 μg/kg	3.4 μg/kg	Ref. 40a, App. B-1e, App. C-1e; Ref. 40b, pp. 3, 96
Arsenic	6.5 mg/kg	1.04 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 16
Cadmium	8.7 J mg/kg	0.52 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 16
Copper	480 mg/kg	2.08 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 16
Lead	200 J mg/kg	0.52 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 16
Mercury	0.2 mg/kg	0.02 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 16
Zinc	800 J mg/kg	2.08 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 16

Waste-H-B2

Hazardous Substance	**Concentration**[3]	**Quantitation Limit**[2]	**Reference**
PCBs, total[1]	17 μg/kg	7.4 μg/kg	Ref. 40a, App. B-1e, App. C-1e; Ref. 40b, p. 4
Arsenic	7.5 mg/kg	1.10 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 17
Cadmium	2.7 J mg/kg	0.55 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 17
Copper	200 mg/kg	2.20 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 17
Lead	53 J mg/kg	0.55 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 17
Mercury	0.064 mg/kg	0.02 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 17
Zinc	350 J mg/kg	2.20 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 17

Waste-H-B3

Hazardous Substance	**Concentration**[3]	**Quantitation Limit**[2]	**Reference**
Arsenic	64 mg/kg	1.04 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 18
Cadmium	2.7 J mg/kg	0.52 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 18
Copper	340 mg/kg	2.08 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 18
Lead	100 J mg/kg	0.52 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 18
Mercury	0.1 mg/kg	0.02 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 18

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
Zinc	370 J mg/kg	2.08 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 18

Waste-H-B4

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
PCBs, total[1]	1,097 μg/kg	34 μg/kg	Ref. 40a, App. B-1e, App. C-1e; Ref. 40b, p. 5
Arsenic	13 mg/kg	1.03 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 19
Cadmium	22 J mg/kg	0.52 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 19
Copper	480 mg/kg	2.06 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 19
Lead	230 J mg/kg	0.52 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 19
Mercury	0.77 mg/kg	0.02 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 19
Zinc	3,600 J mg/kg	2.06 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 19

1 - The concentration presented for PCBs is the sum of the concentrations of PCB isomers detected in the sample. The quantitation limit presented is the reporting detection limit (corrected for percent solids, sample volume, and dilution) of the isomer with the lowest detected concentration in the samples. The reporting detection limits for each isomer are given the hazardous substances section of the Source 2 characterization (Section 2.4.1).

2 - The quantitation limits presented for metals are the reporting detection limits corrected for percent solids of each sample. The reporting detection limit used by the laboratory analyzing the samples was calculated based on reported U-qualified concentrations of each analyte. These U-qualified concentrations were adjusted for sample volume to determine the reporting detection limit. The reporting detection limits for each analyte are given in the hazardous substances section of the Source 2 characterization (Section 2.4.1).

3 - A "J"-qualifier has been applied to the concentrations of cadmium due to minor MS/MSD excursions (Ref. 40a, pp. 57-58). "J"-qualifiers have also been applied to the concentrations of lead due to a laboratory duplicate excursion and to zinc due to an ICP serial dilution excursion (Ref. 40a, pp. 59-61). A "J"-qualifier indicates that the analyte has been positively identified in the sample, but the concentration is estimated (Ref. 15, p. 6).

Hazardous substances associated with Source 5:

PCBs	Copper	Zinc
Arsenic	Lead	
Cadmium	Mercury	

2.4.2 Hazardous Waste Quantity

The HWQ for Source 5 is based on the volume of the source.

2.4.2.1.1 Hazardous Constituent Quantity

Sufficient information is not available to evaluate the hazardous constituent quantity for Source 5.

Sum (pounds) (S): Unknown

Hazardous Constituent Quantity Value: NS

2.4.2.1.2 Hazardous Wastestream Quantity

Sufficient information is not available to evaluate the hazardous wastestream quantity for Source 5.

Sum (pounds) (W): Unknown

Hazardous Wastestream Quantity Value: NS

2.4.2.1.3 Volume

According to a signed 1999 Consent Order between EPA, Monsanto, and Solutia, the volume of waste in Source 5 is estimated to be 110,000 cubic yards (Ref. 22, p. 7). A waste quantity divisor of 2,500 for a landfill is used to calculate the volume assigned value as follows (Ref. 1, Table 2-5, p. 51591):

110,000/2,500 = 44

Dimension of source (yd^3 or gallons) (V): 110,000 yd^3

Volume Assigned Value: 44

2.4.2.1.4 Area

The volume of Source 5 has been determined, therefore the area measure is assigned a value of zero (Ref. 1, Section 2.4.2.1.3, p. 51591).

Area of source (ft^2) (A): NS

Reference(s): NA

Area Assigned Value: 0

2.4.2.1.5 Source Hazardous Waste Quantity Value

The HWQ was determined using the volume of Source 5. The assigned value for the source was then determined using HRS Table 2-5 (Ref. 1, p. 51591).

Source Hazardous Waste Quantity Value: 44

SOURCE DESCRIPTION

2.2 Source Characterization

__Source Number__: 6

__Source Name (type)__: I (landfill)

Source 6 was formerly operated as a landfill and occupies approximately 19.2 acres on property owned by Cerro Copper (Figure 2; Ref. 4a, p. 4-3; Ref. 22, p. 3). Prior to use as a landfill, this area consisted of a series of sand and gravel pits (Ref. 4a, p.4-3). These pits connected Sources 5 and 6 until Queeny Avenue was built. Evidence indicates that Source 5 and Source 6 may still be physically continuous underneath Queeny Avenue (Ref. 4a, p. 4-3; Ref. 10, pp. 8, 9; Ref. 22, pp. 3, 7). Sources 5 and 6 are not evaluated as a single source in this HRS documentation package based on the historic delineation of these sources as separate landfills. [Note that the evaluation of these landfills as separate sources does not impact the hazardous waste quantity factor value.]

An aerial photograph from 1950 indicates disposal activities began at the southern portion of Source 6 prior to 1950 (Ref. 11; Figure 2). Subsequent aerial photographs show continuing activities until sometime between 1968 and 1980. These aerial photographs show disposal activities at various times throughout the entire area of Source 6 (Ref. 7, p. 10; Ref. 12; Ref. 32; Ref. 33; Ref. 34). The majority of Source 6 is located in the Third Subdivision of Commons of Cahokia (Ref. 58, pp. 102-105).

In Notifications of Hazardous Waste Site dated 1981, Monsanto indicated that it disposed of general chemical wastes from its Krummrich plant in Sauget and its Queeny Plant in St. Louis in a landfill along Falling Springs Road until 1957 (Ref. 61, p. 1; Ref. 62, p. 1). Sources 5 and 6 are the only known landfills located on Falling Springs Road. This 'Sauget-Monsanto Landfill', of which Source 6 is known to be a part, was in operation from 1931 until 1957 (Ref. 4a, p. 4-3; Ref. 22, pp. 3, 12). Source 6 received both chemical and municipal waste (Ref. 22, p. 6). Source 6 also received material periodically dredged from Source 1 (Ref. 22, pp. 3, 5). After 1957, Monsanto began disposing of process wastes in a landfill located along the Mississippi River. Many of the wastes and waste types, including chlorobenzene, chlorophenols, nitroanilines, phenol, and miscellaneous solvents, that Monsanto acknowledges were disposed of in its landfill along the river have also been detected in Source 6 (Ref. 57, pp. 1, 2).

IEPA collected eleven soil borings across the source for a 1992 SSI. These borings identified two disposal pits (Ref. 4a, p.4-5). Both pits are at least 23 to 25 ft deep. The depth of fill material ranges from 3 to 13 ft. The wastes found below the fill consist of oily sand, clay, wood, cinders, rubber, and cardboard. Waste materials were located below the water table and the presence of a sludge-like material and the staining of the alluvial deposits were noted. The respective volume of the waste in the large and small pits is estimated at 200,000 yd^3 and 50,000 yd^3 (Ref. 4a, pp. 4-5, 4-6). A 1950 aerial photograph shows several small depressions located on the southern portion of Source 6 (Ref. 11; Figure 2). A 1955 aerial photograph shows another depression that also appears to be filled with water, located north of the current Queeny Avenue (Ref. 12).

On September 20, 1989 a drilling crew working at Source 6 accidentally augered through a buried drum (Ref. 19, p. 1; Ref. 20, p. 1; Ref. 21, p. 2). An unknown amount of vapor was emitted, and five workers were hospitalized subsequent to the incident. A soil sample was collected from the boring 4 hours later and was analyzed by Monsanto. Monsanto's laboratory could only determine that the sample contained "a heavy distillate with a high boiling point" (Ref. 19, p. 2; Ref. 20, p. 2). Monsanto returned the remainder of the sample to Cerro Copper who sent it to another laboratory for analysis (Ref. 19, p. 2; Ref. 20, p. 2). The results for sample JM/G09/22/89-1 revealed extensive VOC and SVOC contamination (Ref. 52, pp. 1, 2). On September 25, 1989 Cerro Copper re-augered the location at which the incident occurred and re-sampled. Analysis of this sample (D102) confirmed the previous results (Ref. 53, pp. 4, 6, 8, 9, 11, 14). A letter sent from IDPH to a member of the drilling crew exposed to the vapor described the presence of VOCs, SVOCs, PCBs, and dioxins (Ref. 21).

The surface of Source 6 is covered with rock, graded, and level (Ref. 3a, p. 2-7; Ref. 4a, p. 4-5; Ref. 14, pp. 1-1, 1-2; Ref. 22, p. 3). Cerro Copper currently uses Source 6 to park machinery (Ref. 3a, p. 2-7; Ref. 14, p. 1-2; Ref. 22, p. 3). Access is restricted by a chain-link fence surrounding the entire Cerro Copper property (Ref. 3a, p. 2-7). Drainage from Source 6 is toward former Dead Creek segment CS-A (Source 1) except on the northern portion of the source, where runoff may collect in a former depression area (Ref. 10, p. 4). Source 6 is adjacent to Source 1, formerly Dead Creek segment CS-A, and wastes from Source 6 may have leached into CS-A (Source 1) and to subsequent downstream areas (Ref. 22, p. 3).

Source Location:

Source 6 is located adjacent to the east bank of Source 1. It is bordered on the north by the Alton & Southern Railroad, on the east by Falling Springs Road, and on the south by Queeny Avenue (Ref. 8). Source 6 is identified in Figure 2 and is visible in aerial photographs of the site (Ref. 7; Ref. 11; Ref. 12; Ref. 32; Ref. 33; Ref. 34).

Containment:

Release via overland migration or flood

Source 6 does not have a maintained engineered cover or a functioning and maintained run-on control system and run-off management system (Ref. 14, pp. 1-1, 1-2). In addition, it is not documented that Source 6 is designed, constructed, operated, and maintained to prevent a washout of hazardous substances by flood. Therefore, surface water overland flow and flood containment values of 10 are assigned (Ref. 1, Table 4-2, Table 4-8, pp. 51609, 51611).

2.4.1 Hazardous Substances

In October 1999, Solutia installed four borings at Source 6 for an RI/FS (Ref. 10, p. 40; Ref. 40a, App. B-1). A discrete surface sample of waste material was collected at each boring location at a depth of 0-0.5 ft bgs (Ref. 10, p. 40; Ref. 40a, App. B-1). These samples were analyzed for VOCs, SVOCs, metals, PCBs, pesticides, herbicides, and dioxins/furans (Ref. 10, pp. 41-42; Ref. 40a, App. B-1). Although SVOCs, pesticides, and dioxins/furans were detected in the Source 6 samples, only the analytical data for PCBs and metals are presented below (Ref. 40a, App. B-1). These samples consisted of waste material, not native soil. Therefore, the hazardous substance concentrations in these samples do not need to be compared to a background concentration.

In addition, a 1988 ESI conducted by IEPA included the collection of 16 subsurface samples from Source 6. Analysis of these samples also indicated the presence of VOCs, SVOCs, PCBs, pesticides, and metals (Ref. 3b, pp. 443-471).

Waste-I-B1

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
Arsenic	4.9 J mg/kg	1.05 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 20
Cadmium	2.2 J mg/kg	0.05 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 20
Copper	2,000 J mg/kg	2.11 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 20
Lead	220 J mg/kg	0.05 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 20
Mercury	0.057 mg/kg	0.02 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 20
Zinc	1,200 J mg/kg	2.11 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 20

Waste-I-B2

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
PCBs, total[1]	121,280 μg/kg	37 μg/kg	Ref. 40a, App. B-1e, App. C-1e; Ref. 40b, p. 6
Arsenic	9.7 J mg/kg	1.11 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 21
Cadmium	31 J mg/kg	0.56 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 21
Copper	10,000 J mg/kg	2.22 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 21
Lead	1,500 J mg/kg	0.56 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 21
Mercury	2 mg/kg	0.02 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 21

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
Zinc	2,800 J mg/kg	2.22 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 21

Waste-I-B3

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
PCBs, total[1]	3,418 μg/kg	36 μg/kg	Ref. 40a, App. B-1e, App. C-1e; Ref. 40b, p. 7
Arsenic	12 J mg/kg	1.09 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 22
Cadmium	9.2 J mg/kg	0.54 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 22
Copper	13,000 J mg/kg	2.17 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 22
Lead	830 J mg/kg	0.54 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 22
Mercury	0.31 mg/kg	0.02 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 22
Zinc	1,300 J mg/kg	2.17 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 22

Waste-I-B4

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
Arsenic	3.9 J mg/kg	1.03 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 23
Cadmium	2.1 J mg/kg	0.52 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 23
Copper	1,200 J mg/kg	2.06 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 23

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
Lead	190 J mg/kg	0.52 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 23
Mercury	0.047 mg/kg	0.02 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 23
Zinc	310 J mg/kg	2.06 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 23

1 - The concentration presented for PCBs is the sum of the concentrations of PCB isomers detected in the sample. The quantitation limit presented is the reporting detection limit (corrected for percent solids, sample volume, and dilution) of the isomer with the lowest detected concentration in the samples. The reporting detection limits for each isomer are given in the hazardous substance section of the Source 2 characterization (Section 2.4.1).

2 - The quantitation limits presented for metals are the reporting detection limits corrected for percent solids of each sample. The reporting detection limit used by the laboratory analyzing the samples was calculated based on reported U-qualified concentrations of each analyte. These U-qualified concentrations were adjusted for sample volume to determine the reporting detection limit. The reporting detection limits for each analyte are given in the hazardous substances section of the Source 2 characterization (Section 2.4.1).

3 - A "J"-qualifier has been applied to the concentrations of arsenic, cadmium, copper, lead, and zinc due to field duplicate excursions (Ref. 40a, pp. 61-62). Additionally, the concentrations of copper were also "J"-qualified due to a laboratory duplicate excursion (Ref. 40a, pp. 59-60). A "J"-qualifier indicates that the analyte has been positively identified in the sample, but the concentration is estimated (Ref. 15, p. 6).

Hazardous substances associated with Source 6:

PCBs	Lead
Arsenic	Mercury
Cadmium	Zinc
Copper	

2.4.2 Hazardous Waste Quantity

The HWQ for Source 6 is based on the volume of the source.

2.4.2.1.1 Hazardous Constituent Quantity

Sufficient information is not available to evaluate the hazardous constituent quantity for Source 6.

Sum (pounds) (S): Unknown

Hazardous Constituent Quantity Value: NS

2.4.2.1.2 Hazardous Wastestream Quantity

Sufficient information is not available to evaluate the hazardous wastestream quantity for Source 6.

Sum (pounds) (W): Unknown

Hazardous Wastestream Quantity Value: NS

2.4.2.1.3 Volume

A 1992 SSI for IEPA and a signed 1999 Consent Order between EPA, Monsanto, and Solutia estimate the volume of waste in Source 6 to be 250,000 cubic yards (Ref. 4a, p. 4-6; Ref. 22, p. 6). A waste quantity divisor of 2,500 for a landfill is used to calculate the volume assigned value as follows (Ref. 1, Table 2-5, p. 51591):

250,000/2,500 = 100

Dimension of source (yd^3 or gallons) (V): 250,000 yd^3

Volume Assigned Value: 100

2.4.2.1.4 Area

The volume of Source 6 has been determined, therefore the area measure is assigned a value of zero (Ref. 1, Section 2.4.2.1.3, p. 51591).

Area of source (ft^2) (A): NS

Reference(s): NA

Area Assigned Value: 0

2.4.2.1.5 Source Hazardous Waste Quantity Value

The HWQ was determined using the volume of Source 6. The assigned value for the source was then determined using HRS Table 2-5 (Ref. 1, p. 51591).

Source Hazardous Waste Quantity Value: 100

SOURCE DESCRIPTION

2.2 Source Characterization

Source Number: 7

Source Name (type): L (buried/backfilled surface impoundment)

Source 7 is a backfilled surface impoundment that occupies about 7,600 ft^2 (Figure 2; Ref. 5, pp. 1-3, 1-4; Ref. 22, p. 8). In a letter dated August 6, 1971, IEPA directed Harold Waggoner & Co. to eliminate any discharges to Dead Creek after observing tanker trucks labeled as containing corrosive wastes apparently discharging their contents directly into Dead Creek on two occasions (Ref. 59, p. 1). As a result of this letter, Waggoner began using Source 7 in 1971 to dispose of wash water from hazardous waste tankers (Ref. 22, p. 4; Ref. 59, p. 1; Ref. 60, p. 1). Ruan Trucking Company purchased the property in 1974 and continued to use Source 7 for the same purpose (Ref. 5, p. 1-4). According to a signed 1999 Consent Order between EPA, Monsanto, and Solutia, Monsanto/Solutia has also contributed to the waste present in Source 7 (Ref. 22, p. 12). Disposal at Source 7 ceased after 1978 when Metro Construction Company purchased the property (Ref. 5, p. 1-4). The impoundment has been filled and is covered with cinders (Ref. 5, p. 1-4). Source 7 is now used to park heavy construction equipment and access is not restricted (Ref. 3a, p. 2-7; Ref. 5, p. 1-3; Ref. 22, p. 4). Source 7 is located at higher elevation than Source 2 (CS-B), and the land on the west side of Source 7 slopes downward toward Source 2 (Ref. 5, Figures 1-2 and 2-2; Ref. 10, p. 4). As a result, contaminants present in Source 7 may migrate from Source 7 to Source 2 as runoff.

Source Location:

Source 7 is located on the east bank of Source 2 approximately 700 ft south of Queeny Avenue. Source 7 is identified in Figure 2 and is visible in aerial photographs of the site (Ref. 34).

Containment:

Release via overland migration or flood

Source 7 does not have a maintained engineered cover or a functioning and maintained run-on control system and run-off management system (Ref. 5, pp. 1-2 through 1-6). In addition, Source 7 is not designed, constructed, operated, and maintained to prevent the washout of hazardous substances by flood.

Therefore, surface water overland flow and flood containment values of 10 are assigned (Ref. 1, Table 4-2, Table 4-8, pp. 51609, 51611).

2.4.1 Hazardous Substances

In September 1999, Solutia installed four borings at Source 7 for an RI/FS (Ref. 10, p. 40; Ref. 40a, App. B-1). A discrete surface sample of waste material was collected at each boring location at a depth of 0-0.5 ft bgs (Ref. 10, p. 40; Ref. 40a, App. B-1). These samples were analyzed for VOCs, SVOCs, metals, PCBs, pesticides, herbicides, and dioxins/furans (Ref. 10, pp. 41-42; Ref. 40a, App. B-1). Although SVOCs, pesticides, and dioxins/furans were detected in the Source 7 samples collected for the RI/FS, only the analytical data for PCBs and metals are presented below (Ref. 40a, App. B-1). These samples consisted of waste material, not native soil. Therefore, the hazardous substance concentrations in these samples do not need to be compared to a background concentration.

Previous analytical data, including five subsurface samples collected for a 1988 ESI and six surface samples collected for a 1992 investigation by Monsanto, also indicate the presence of VOCs, SVOCs, PCBs, and metals in Source 7 (Ref. 3b, pp. 445-472; Ref. 5, p. 4-3).

Waste-L-B1

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
Arsenic	35 mg/kg	1.03 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 24
Cadmium	10 J mg/kg	0.52 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 24
Copper	1,700 mg/kg	2.06 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 24
Lead	940 J mg/kg	0.52 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 24
Mercury	0.56 mg/kg	0.02 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 24
Zinc	870 J mg/kg	2.06 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 24

Waste -L-B2

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
PCBs, total[1]	1,171 μg/kg	54 μg/kg	Ref. 40a, App. B-1e; App. C-1e; Ref. 40b, pp. 8, 97
Arsenic	37 mg/kg	1.07 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 25
Cadmium	4.6 J mg/kg	0.54 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 25
Copper	4,700 mg/kg	2.15 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 25
Lead	190 J mg/kg	0.54 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 25
Mercury	0.34 mg/kg	0.02 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 25
Zinc	420 J mg/kg	2.15 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 25

Waste-L-B3

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
Arsenic	30 mg/kg	1.09 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 26
Cadmium	0.71 J mg/kg	0.54 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 26
Copper	190 mg/kg	2.17 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 26
Lead	64 J mg/kg	0.54 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 26
Mercury	0.039 mg/kg	0.02 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 26

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
Zinc	160 J mg/kg	2.17 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 26

Waste-L-B4

Hazardous Substance	Concentration[3]	Quantitation Limit[2]	Reference
PCBs, total[1]	348 μg/kg	74 μg/kg	Ref. 40a, App. B-1e, App. C-1e; Ref. 40b, pp. 9, 97
Arsenic	31 mg/kg	1.11 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 27
Cadmium	7.1 J mg/kg	0.56 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 27
Copper	460 mg/kg	2.22 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 27
Lead	280 J mg/kg	0.56 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 27
Mercury	0.35 mg/kg	0.02 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 27
Zinc	590 J mg/kg	2.22 mg/kg	Ref. 40a, App. B-1f; Ref. 40b, p. 27

1 - The concentration presented for PCBs is the sum of the concentrations of PCB isomers detected in the sample. The quantitation limit presented is the reporting detection limit (corrected for percent solids, sample volume, and dilution) of the isomer with the lowest detected concentration in the samples. The reporting detection limits for each isomer are given in the hazardous substance section of the Source 2 characterization (Section 2.4.1).

2 - The quantitation limits presented for metals are the reporting detection limits corrected for percent solids of each sample. The reporting detection limit used by the laboratory analyzing the samples was calculated based on reported U-qualified concentrations of each analyte. These U-qualified concentrations were adjusted for sample volume to determine the reporting detection limit. The reporting detection limits for each analyte are given in the hazardous substances section of the Source 2 characterization (Section 2.4.1).

3 - A "J"-qualifier has been applied to the concentrations of cadmium based on a MS/MSD excursion (Ref. 40a, pp. 58-59). The concentrations of lead are "J"-qualified due to a laboratory duplicate excursion and the concentrations of zinc are "J"-qualified based on an ICP serial dilution excursion (Ref. 40a, pp. 59-61). A "J"-qualifier indicates that the analyte has been positively identified in the sample, but the concentration is estimated (Ref. 15, p. 6).

Hazardous substances associated with Source 7:

PCBs	Lead
Arsenic	Mercury
Cadmium	Zinc
Copper	

2.4.2 **Hazardous Waste Quantity**

The HWQ for Source 7 is based on the area of the source.

2.4.2.1.1 **Hazardous Constituent Quantity**

Sufficient information is not available to evaluate the hazardous constituent quantity for Source 7.

Sum (pounds) (S): Unknown

Hazardous Constituent Quantity Value: NS

2.4.2.1.2 **Hazardous Wastestream Quantity**

Sufficient information is not available to evaluate the hazardous wastestream quantity for Source 7.

Sum (pounds) (W): Unknown

Hazardous Wastestream Quantity Value: NS

2.4.2.1.3 **Volume**

Sufficient information is not available to determine the depth of Source 7. For this reason, the volume of Source 7 cannot be determined and a value of zero is assigned (Ref. 1, Section 2.4.2.1.3, p. 51591).

Dimension of source (yd^3 of gallons) (V): Unknown

Volume Assigned Value: 0

2.4.2.1.4 **Area**

Based on the 1991 borings installed by Monsanto at Source 7, Source 7 encompasses an area of approximately 7,600 ft^2 (Ref. 5, p. 1-3, Figure 1-2). A waste quantity divisor of 13 for impoundments is used to calculate the area value as follows (Ref. 1, Table 2-5, p. 51591):

7,600/13 = 584.62

Area of source (ft^2) (A): 7,600

Reference (s): 5, p. 1-3

Area Assigned Value: 584.62

2.4.2.1.5 Source Hazardous Waste Quantity Value

The HWQ was determined using the area of Source 7. The assigned value for the source was then determined using HRS Table 2-5 (Ref. 1, p. 51591).

Source Hazardous Waste Quantity Value: 584.62

SUMMARY OF SOURCE DESCRIPTIONS

Source Number	Source Name	Source Hazardous Waste Quantity Value	Containment			
			Ground Water	Surface Water	Gas	Air Particulate
1	CS-A	NS	NS	10	NS	NS
2	CS-B	8,356.5	NS	10	NS	NS
3	CS-C to the PPE	>0	NS	10	NS	NS
4	Area G	24	NS	10	NS	NS
5	Area H	44	NS	10	NS	NS
6	Area I	100	NS	10	NS	NS
7	Area L	584.62	NS	10	NS	NS

OTHER POSSIBLE SOURCES

Area M

Area M is a sand mining pit excavated in the 1940s adjacent to the southeastern part of CS-B (Source 2) (Ref. 5, pp. 1-3, 1-4). The pit encompasses an area of approximately 59,200 ft^2 and contained 14 ft of water in 1992 (Ref. 5, p. 1-3). According to a local resident, Area M may have received direct dumping of unknown wastes (Ref. 14, p. 2). Area M is hydrologically connected to CS-B by an eight-foot channel that allows water to flow between the two and could provide a mechanism for the migration of hazardous substances (Ref. 5, p. 1-3; Ref. 22, p. 4). Analytical data collected for a 1992 SI indicated that sediments in Area M contained VOCs, SVOCs, PCBs, and metals (Ref. 5, p. 4-4). This SI estimated that 3,600 yd^3 of sediments in Area M were impacted by PCBs (Ref. 5, p. 4-4). A water sample collected from Area M in March 1994 in response to a citizen complaint indicated the presence of metals, VOCs, SVOCs, pesticides, and herbicides (Ref. 51). Solutia collected a sediment sample in Area M in October 1999 that contained elevated concentrations of VOCs, SVOCs, PCBs, pesticides, herbicides, and dioxins/furans (Ref. 39, pp. 3-11; Ref. 40a, App. B-4, App. C-4). Although an eight-foot chain link fence was constructed around Area M and CS-B in 1982, Area M is not contained against hazardous substances migrating from the area by flow or washing out in the event of a flood. Area M may also impact an agricultural field located immediately to the north (Ref. 14, p. 3; Ref. 22, p. 4). Due to the hydrologic connection between Area M and Dead Creek, it is unclear if Area M is a separate source or is part of Dead Creek. Therefore, Area M is not evaluated as a source for this HRS documentation package.

Area N

Area N is a sand pit adjacent to the eastern side of CS-C (part of Source 3) that was excavated between 1937 and 1950 (Ref. 4a, p. 2-6; Ref. 11; Ref. 18; Figure 2). Area N encompasses an area of 4 to 5 acres (Ref. 22, pp. 4, 9). The pit may be as deep as 30 ft and is filled with concrete rubble, scrap wood, and demolition debris (Ref. 22, p. 9). During a 1991 SSI, a black and reddish-brown staining of the silts and sands at Area N was noted. Analysis of soil samples indicated the presence of PAHs (Ref. 4a, p. 4-10). Between September 1999 and May 2000, Solutia collected two surface soil and 2 subsurface soil samples from Area N for an RI/FS (Ref. 63, pp. 15-32). Analysis of these samples indicated that Area N contains elevated concentrations of VOCs, SVOCs, PCBs, pesticides, herbicides, and metals (Ref. 40a, App. B-3; Ref. 63, pp. 15-32). Although Area N is inactive and fenced, it is not contained against hazardous substances migrating from the area by flow or washing out in the event of a flood.

Areas of Contaminated Soil

Solutia conducted extensive surface and subsurface soil sampling around Dead Creek between September 1999 and May 2000 for an RI/FS (Ref. 40a, App. B-3; Ref. 63, pp. 15-32). Samples were collected in developed and undeveloped areas susceptible to flooding and deposition of wind-blown dust (Ref. 10, p. 110; Ref. 63, pp. 15-32).

The undeveloped area sampling was conducted to evaluate the extent of migration via surface water (over-bank flow) and air (wind-blown dust) (Ref. 10, p. 111). This sampling area included places where water backs up during heavy rains and areas along segments of Dead Creek where PCBs are known to occur (Ref. 10, p. 110). Forty-five surface soil samples were collected at a depth of 0 to 0.5 ft at an interval of every 200 ft along seven transects centered on Dead Creek (Ref. 10, p. 111; Ref. 40a, App. B-3, App. C-3; Ref. 63, pp. 15-23). Forty-five subsurface soil samples were collected at a depth of 3 to 6 ft from the same locations as the surface soil samples (Ref. 10, p. 112; Ref. 40a, App. B-3, App. C-3; Ref. 63, pp. 24-32).

The developed area sampling was conducted in the residential developments around Dead Creek where twenty surface soil samples were collected at a depth of 0 to 0.5 ft along streets and Dead Creek (Ref. 10, pp. 110, 116; Ref. 63, pp. 15-23). Twenty subsurface soil samples were collected at a depth of 0.5 to 6 ft from the same locations as the surface soil samples (Ref. 10, p. 116; Ref. 63, pp. 24-32).

Analytical results from these soil samples reveal widespread areas of soil contaminated with elevated concentrations of VOCs, SVOCs, PCBs, pesticides, herbicides, and dioxins/furans (Ref. 40a, App. B-3, App. C-3; Ref. 63, pp. 15-32). Metals may also be present at unnaturally high concentrations (Ref. 63, pp. 15-32). PCBs are present at elevated concentrations in surface soils of both developed and undeveloped areas (Ref. 40a, App. B-3e; Ref. 63, pp. 15-32).

4.1 OVERLAND/FLOOD MIGRATION COMPONENT

The Sauget Area 1 site is located in the Mississippi River watershed. This section describes the overland flow/flood migration component of the surface water migration pathway. There are no drinking water targets known to be located within the 15-mile TDL. Therefore, only the likelihood of release and waste characteristic factor categories are scored for the drinking water threat. All three factor categories are scored for the human food chain and environmental threats.

4.1.1 Definition of Hazardous Substance Migration Path for Overland/Flood Component

The surface water migration pathway for the Sauget Area 1 site consists of runoff routes through Dead Creek, a wetland along Dead Creek, Old Prairie duPont Creek, the Cahokia Chute of the Mississippi River (Cahokia Chute), and the Mississippi River (Figure 1). Water levels in the upper portion of Dead Creek vary substantially and the creek becomes a dry ditch during periods of low precipitation (Ref. 3a, p. 2-8; Ref. 24, pp. 17, 18). Therefore, the upper portion of Dead Creek is evaluated as an intermittent stream. The in-water segment begins at the wetland along creek segment CS-F. The wetland along CS-F is forked, with the northeastern and southern forks being a part of CS-F (Figure 1; Figure 2; Ref. 25; Ref. 63, pp. 10-14, 33-41). Although the northwestern fork of the wetland is sometimes referred to as Borrow Pit Lake, the wetland is continuous and is considered a single wetland (Ref. 10, p. 125; Ref. 25; Ref. 63, pp. 10-14, 33-41).

The overland segment of the surface water migration path consists of runoff routes from the Sauget Area 1 sources to the PPE of hazardous substances to surface water at the wetland along CS-F (Figure 2). Because of surface topography and the proximity of sources to Dead Creek, each of the sources drains into the creek directly (Ref. 8). Source 1 (CS-A) formerly drained directly into Source 2 (CS-B) (Ref. 13, p. 19). Before the culvert at Judith Lane was reportedly sealed, Source 2 drained directly to Source 3 (CS-C, CS-D, part of CS-E) and subsequent downstream creek segments (Ref. 11; Ref. 12; Ref. 13, p. 19). Additionally, water is believed to flow downstream past the blocked culvert when it reaches an undetermined level in Source 2 (Ref. 13, p. 19). The overland segment continues south of Source 3, through the remaining portion of CS-E and the northern portion of CS-F. The overland segment terminates at the perennial wetland in CS-F, where the in-water segment begins. The portion of Dead Creek between Source 3 and the wetland in CS-F is also considered intermittent because it has been observed without water (Ref. 24, p. 19).

Overland segments and distances to surface water for each of the Sauget Area 1 sources are summarized below.

Source	Description of Overland Segment	Length (ft)
1	Dead Creek (through Sources 2 and 3) from Queeny Avenue to the PPE	NE
2	Dead Creek (through Source 3) from Judith Lane to the PPE	8,500
3	Dead Creek from the end of Source 3 (sample FASED-CSF-S28) to the PPE	0 to 10 ft
4	Southern limit of Source 4 on bank of CS-B through Dead Creek (through 3/4 of Source 2 and all of Source 3) to the PPE	NE
5	Land between Source 5 and Source 2 through Dead Creek (through Sources 2 and 3) from Queeny Avenue to the PPE	10,450
6	Dead Creek (through Sources 2 and 3) from Queeny Avenue to the PPE	10,450
7	Bank of CS-B through Dead Creek (½ of Source 2 and all of Source 3) to PPE	9,475

The in-water segment of the surface water migration pathway begins at the PPE and consists of five segments. The PPE is the point where Dead Creek meets the wetland in creek segment CS-F. The wetland is denoted on a U.S. Fish and Wildlife Service NWI map as a palustrine, forested wetland and was delineated by the Illinois Department of Conservation (Ref. 24, p. 4, 5; Ref. 25). Palustrine, forested wetlands meet the definition of a wetland for HRS purposes (Ref. 1, Table 4-24, p. 51625). The five in-water segments were measured on the USGS topographic and the NWI map (Ref. 8; Ref. 25) and are described below.

Segment	Description	Length (ft)	Mile/Feet Marker
1	Wetland and Dead Creek in CS-F from PPE to Country Road	5,800	1.1/5,800
2	Dead Creek from Country Road to confluence with Old Prairie duPont Creek	600	1.2/6,400
3	Confluence of Old Prairie duPont Creek and Dead Creek to Cahokia Chute	2,500	1.7/8,900
4	Cahokia Chute to the Mississippi River	5,700	2.8/14,600
5	Mississippi River	64,600	15/79,200

4.1.2 Drinking Water Threat

No drinking water intakes are known to be located within the 15-mile TDL (Ref. 35; Ref. 55). The City of St. Louis obtains its drinking water supply from the Mississippi River at river mile 190.4, upstream of the in-water segment of the TDL (Ref. 54). The City of East St. Louis obtains its water supply from the Mississippi River at river mile 180, which is also upstream of the in-water segment of the TDL (Ref. 35). The nearest downstream drinking water intake from the Mississippi River in Missouri is near Festus, Missouri approximately 20 miles downstream of the confluence with the Cahokia Chute (approximately 7.8 miles downstream of the end of the TDL) (Ref. 55). The nearest downstream drinking water intake in Illinois is on the Mississippi River at river mile 110, approximately 64 miles downstream of the confluence with the Cahokia Chute (approximately 51.8 miles downstream of the end of the TDL) (Ref. 35).

The scores for the likelihood of release factor category value and the hazardous waste quantity factor value for the surface water migration pathway are determined in the evaluation of the drinking water threat. These values subsequently apply to the human food chain and environmental threats. Because there are no drinking water targets, the evaluation of the drinking water threat below consists only of the likelihood of release factor category value and hazardous waste quantity factor value.

4.1.2.1 Likelihood of Release

The likelihood of release factor category value is based on two observed releases by chemical analysis, as presented in the following subsections.

4.1.2.1.1 Observed Release

Analytical data from two separate sampling events establish two observed releases by chemical analysis to the palustrine, forested wetland along CS-F. The identifications of observed releases by chemical analysis are based on sediment samples collected from the wetland by EPA in April 1997 and by Solutia in October 1999. Analytical results for both sampling events are presented below.

<u>Chemical Analysis</u> - April 1997

In April 1997, EPA conducted a Preliminary Ecological Risk Assessment for the wetland located along CS-F. Nine sediment samples, including one background sample and one field duplicate sample, were collected from the wetland (Ref. 65, pp. 2-3, 2-10). All samples are two- or three-point composites collected east to west across the channel in the wetland. The east side of the channel appeared to be deeper and more permanent than the central portion or the west side (Ref. 65, p. 2-3). All samples were analyzed according to EPA SW 846 Methods: 7471 for mercury, 6010 for other metals, and 8081 for PCBs (Ref. 65, pp. C-9 through C-11; C-12 through C-14; Ref. 67). Several of the samples were also analyzed for pesticides, PAHs, and dioxins/furans. Although PAHs and dioxins/furans were present in release samples at concentrations significantly greater than the background concentration, only the analytical data for PCBs and metals are presented below (Ref. 65, pp. C-36, C-42, C-49 through C-59).

The background and release samples collected for this sampling event are considered similar because they were collected from the same wetland using the same sampling methods and were analyzed by the same laboratory procedures.

Background Concentrations

Sample F107 was collected from the northwestern portion of the wetland. The wetland is forked and this portion of the wetland is not expected to be influenced by contamination from Dead Creek (Ref. 25; Ref. 65, p.2-10).

Sample ID	**Sample Medium**	**Sampling Location**	**Depth**	**Date**	**Reference**
F107	sediment	NW portion of CS-F wetland	unknown	4/18/1997	Ref. 65, pp. 2-2, 2-3, 2-10, C-2, C-3

Sample ID	**Hazardous Substance**	**Concentration**	**Sample Detection Limit[2]**	**Reference**
F107[1]	Aroclor-1254	ND	100 μg/kg	Ref. 65, pp. C-3, C-43
	Cadmium	ND	1.0 mg/kg	Ref. 65, pp. C-2, C-41
	Lead	28.2 mg/kg	5 mg/kg	Ref. 65, pp. C-2, C-41
	Mercury	ND	0.13 mg/kg	Ref. 65, pp. C-2, C-41

1 - The data were subject to a validation review and are considered acceptable (Ref. 65, pp. C-8, C-11, C-13, C-16, C-57; Ref. 67).

2 - The detection limits presented with the data are the sample detection limits reported by the laboratory (Ref. 65, pp. C-23, C-28, C-32, C-45, C-47, Ref. 67, p. 4).

Release Samples

Samples F-101 through F109 were collected downgradient of the outlet of Dead Creek into the wetland. Samples F105 and F106 were collected on either side of this outlet in the northeastern portion of the wetland and all other samples were collected in ascending order toward the southern outlet of the wetland (Ref. 65, p. 2-10). Sample F109 is a field duplicate sample of F108.

Sample ID	Sample Medium	Sampling Location	Depth	Date	Reference
F102	sediment	NE portion of CS-F wetland	unknown	4/18/1997	Ref. 65, pp. 2-2, 2-3, 2-10
F103	sediment	NE portion of CS-F wetland	unknown	4/18/1997	Ref. 65, pp. 2-2, 2-3, 2-10
F104	sediment	southern portion of CS-F wetland	unknown	4/18/1997	Ref. 65, pp. 2-2, 2-3, 2-10
F108	sediment	southern portion of CS-F wetland	unknown	4/18/1997	Ref. 65, pp. 2-2, 2-3, 2-10
F109	sediment	southern portion of CS-F wetland	unknown	4/18/1997	Ref. 65, pp. 2-2, 2-3, 2-10

Sample ID	Hazardous Substance	Concentration	Sample Detection Limit[3]	Reference
F102[1]	Aroclor-1254	2,100 μg/kg	500 μg/kg	Ref. 65, pp. C-3, C-25
	Cadmium	4.56 mg/kg	1 mg/kg	Ref. 65, pp. C-2, C-23
	Lead	199 mg/kg	5 mg/kg	Ref. 65, pp. C-2, C-23
	Mercury	0.24 J mg/kg[2]	0.1 mg/kg	Ref. 65, pp. C-2, C-23
F103[1]	Aroclor-1254	500 μg/kg	100 μg/kg	Ref. 65, pp. C-3, C-29
	Cadmium	8.29 mg/kg	1 mg/kg	Ref. 65, pp. C-2, C-28
	Lead	111 mg/kg	5 mg/kg	Ref. 65, pp. C-2, C-28
	Mercury	0.3 J mg/kg[2]	0.1 mg/kg	Ref. 65, pp. C-2, C-28
F104[1]	Aroclor-1254	520 μg/kg	100 μg/kg	Ref. 65, pp. C-3, C-33
	Cadmium	16.3 mg/kg	1 mg/kg	Ref. 65, pp. C-2, C-32

Sample ID	Hazardous Substance	Concentration	Sample Detection Limit[3]	Reference
	Lead	124 mg/kg	5 mg/kg	Ref. 65, pp. C-2, C-32
	Mercury	0.55 J mg/kg[2]	0.11 mg/kg	Ref. 65, pp. C-2, C-32
F108[1]	Mercury	0.12 J mg/kg[2]	0.11 mg/kg	Ref. 65, pp. C-2, C-45
F109[1]	Mercury	0.11 J mg/kg[2]	0.11 mg/kg	Ref. 65, pp. C-2, C-47

1 - The data were subject to a validation review and are considered acceptable (Ref. 65, pp. C-8, C-11, C-13, C-16, C-57; Ref. 67).

2 - A "J"-qualifier has been applied to the concentrations of mercury due to low percent recoveries (Ref. 65, pp. C-23, C-28, C-32, C-45, C-47; Ref. 67, pp., 37-40). Therefore, the concentrations of mercury are considered biased low. Mercury was not detected in the background sample and biased low release sample concentrations are not adjusted because they are a minimum value and meet observed release criteria (Ref. 15, p. 8). A "J"-qualifier indicates that the analyte has been positively identified in the sample, but the concentration is estimated (Ref. 15, p. 6).

3 - The detection limits presented with the data are the sample detection limits reported by the laboratory (Ref. 65, pp. C-23, C-28, C-32, C-45, C-47, Ref. 67, p. 4).

<u>Chemical Analysis</u> - October 1999

Solutia conducted extensive sample collection activities at the site from September 1999 through May 2000 for an RI/FS (Ref. 40a, p. 1). Sediment samples were collected in October 1999. Samples were also collected from waste material, ground water, soil, surface water, air, and biota during the sampling event (Ref. 40a). All samples except air and biota samples were analyzed for VOCs, SVOCs, pesticides, herbicides, PCBs, metals, and dioxins/furans (Ref. 40a). Air samples were not analyzed for pesticides or herbicides and biota samples were not analyzed for VOCs (Ref. 40a, App. B-7, B-8). A general summary of the biota samples is presented below, followed by a discussion of and the analytical data for the sediment samples.

<u>Biota Samples</u>

The biota samples consisted of fish tissue samples collected from the wetland along CS-F and from reference locations in another watershed selected by Solutia as comparable to the Dead Creek watershed (Ref. 10, p. 129, Figure 11; Ref. 63, p. 42). All three tissue samples collected from fish in the wetland contained concentrations of PCBs significantly greater than the tissue samples collected from fish at the reference (background) locations (Ref. 40a, App. B-8d, C-8d; Ref. 40b, pp. 88-94). The greatest concentration of PCBs, 320 μg/kg, was detected in sample LMB-BP-COMP3 (Ref. 40a, App. B-8d, App. C-8d; Ref. 40b, pp . 90, 111). Only one of the four reference tissue samples contained any detectable level of PCBs, 18.8 μg/kg in sample LMB-REF1-COMP2 (Ref. 40a, App. B-8d, C-8d; Ref. 40b, pp. 92, 111).

Sediment Samples

Industry-Specific Analysis

In January and February 2000, Solutia collected 31 sediment samples from the wetland along CS-F that were analyzed for "industry specific" constituents, including PCBs, copper, and zinc (Ref. 40a, pp. 173-179, App. B-5; Ref. 63, pp. 10-12). Eight samples were collected from the northwestern fork of the wetland, which is not expected to be influenced by contamination from Dead Creek (Ref. 63, pp. 10-14). These eight samples are considered representative of background conditions.

Twenty-three samples were collected from the CS-F portion of the wetland (northeastern and southern forks) (Ref. 63, pp. 10-14). None of the background samples collected from the northwestern portion of the wetland contained any concentration of PCBs (Ref. 40a, App. B-5a; Ref. 63, p. 10). Sixteen of the twenty-three samples collected from the CS-F portion of the wetland contained elevated concentrations of PCBs. The highest concentration of PCBs, 1,805 μg/kg, was detected in sample FASED-CSF-S27E, which was collected where Dead Creek enters the wetland (Ref. 40a, App. B-5a; Ref. 63, p. 10; Ref. 40b, pp. 85, 109). Sample FASED-CSF-S28, collected in Dead Creek immediately upgradient of the wetland, contained 6,290 μg/kg of PCBs (Ref. 40a, App. B-5a; Ref. 63, p. 10; Ref. 40b, pp. 86, 109). The analytical results of this sampling event document that PCBs, copper, and zinc are present in the sediments of the wetland located along CS-F at concentrations significantly greater than the background concentrations (Ref. 40a, App. B-5; Ref. 63, p. 10). However, only the data for the full scan/ecological analysis are presented below.

Full Scan/Ecological Analysis

In October 1999, Solutia collected six vertically-integrated sediment core samples from the wetland (Ref. 10, pp. 125, 129; Ref. 40a, App. B-4). These core samples were analyzed for VOCs, SVOCs, pesticides, herbicides, PCBs, metals, and dioxins/furans (Ref. 40a, p. 1, App. B-4). Although VOCs, SVOCs, pesticides, and dioxins/furans were detected at concentrations significantly greater than background concentrations for those analytes, only the analytical data for PCBs and metals are presented below (Ref. 39, pp. 3-7; Ref. 40a, App. B-4).

These samples were analyzed for PCBs using EPA Method 680, for metals using EPA Method 6010B, and for mercury using EPA Method 7471A (Ref. 40a, pp. 195, 198). Quality control data and analytical data sheets are included with the August 2000 Data Validation Report (Ref. 40a). The data were evaluated using the quality assurance/quality control criteria established in the EPA methods and the

Quality Assurance Project Plan in the Support Sampling Plan (Ref. 10; Ref. 40a, pp. 1, 273). The data were qualified based on the Data Validation Plan for the Support Sampling Plan (Ref. 10; Ref. 40a, pp. 1, 273). Although the data were not generated under the EPA Contract Laboratory Program, the data are of known and documented quality and are usable for documenting an observed release by chemical analysis (Ref. 15, p. 2). In addition, the Data Validation Report for Solutia concluded that 100 percent of the PCBs and mercury data and 99.7 percent of the metals data for all sediment samples are "usable for qualitative and quantitative purposes" (Ref. 40a, p. 274).

Background Concentrations

During the RI/FS performed by Solutia, three sediment samples were collected in the northwestern fork of the wetland along CS-F to establish background concentrations (Ref. 10, p. 129; Ref. 39, pp. 3-7). This portion of the wetland is upgradient of the outlet of Dead Creek to the wetland and is not expected to be influenced by contamination from Dead Creek. The background and release samples were collected at a depth of 0.2 ft in the sediments of the same wetland and are expected to contain similar sediment types (Ref. 39, pp. 3-11; Ref. 40a, App. B-4). The TOC measured in the three background wetland samples is similar to the TOC measured in the three release samples collected in the northeastern, CS-F portion of the wetland (Ref. 40a, App. B-4g, App. C-4g; Ref. 40b, pp. 79, 105). In addition, both the background and the release samples were collected using the same sampling methods and analyzed according to the same analytical methods by the same laboratory (Ref. 10, pp. 129-132; Ref. 40a, App. B-4). Therefore, the concentrations in samples BPL-ESED-S1, BPL-ESED-S2, and BPL-ESED-S3 are considered appropriate to establish background concentrations and to be compared with the concentrations detected in samples SED-CSF-S1, SED-CSF-S2, and SED-CSF-S3. The highest concentration of each analyte detected in any of the three background samples is presented below (Ref. 40b, pp. 67-69).

Sample ID	Sample Medium	Sampling Location	Depth	Date	Reference
BPL-ESED-S1	sediment	NW portion of wetland	0.2 ft	October 1999	Ref. 39, pp. 3-7; Ref. 40a, App. B-4
BPL-ESED-S2	sediment	NW portion of wetland	0.2 ft	October 1999	Ref. 39, pp. 3-7; Ref. 40a, App. B-4
BPL-ESED-S3	sediment	NW portion of wetland	0.2 ft	October 1999	Ref. 39, pp. 3-7; Ref. 40a, App. B-4

Hazardous Substance	Sample ID	Background Concentration	Quantitation Limit	Reference
PCBs, total[1]	BPL-ESED-S1	ND	46 μg/kg	Ref. 40a, App. B-4e; Ref. 40b, p. 43
	BPL-ESED-S2	ND	9.7 μg/kg	Ref. 40a, App. B-4e; Ref. 40b, p. 44
	BPL-ESED-S3	ND	9.2 μg/kg	Ref. 40a, App. B-4e; Ref. 40b, p. 45
Cadmium	BPL-ESED-S2	2.7 J mg/kg[3]	1.47 mg/kg[2]	Ref. 40a, App. B-4f; Ref. 40b, p. 68
Copper	BPL-ESED-S2	64 J mg/kg[3]	5.88 mg/kg[2]	Ref. 40a, App. B-4f; Ref. 40b, p. 68
Lead	BPL-ESED-S2	58 J mg/kg[3]	1.47 mg/kg[2]	Ref. 40a, App. B-4f; Ref. 40b, p. 68
Mercury	BPL-ESED-S2	0.16 J mg/mg[3]	0.06 mg/kg[2]	Ref. 40a, App. B-4f; Ref. 40b, p. 68
Zinc	BPL-ESED-S2	370 J mg/kg[3] (555 mg/kg)	5.88 mg/kg[2]	Ref. 15, pp. 8, 18; Ref. 40a, App. B-4f; Ref. 40b, p. 68

1 - The concentration presented for PCBs is the sum of the concentrations of PCB isomers detected in the sample. The quantitation limit presented for PCBs is the reporting detection limit (corrected for percent solids, sample volume, and dilution) of the isomer with the lowest detected concentration in the sample. The reporting detection limit used by the laboratory analyzing the samples was calculated based on reported U-qualified concentrations of each isomer. These U-qualified concentrations were adjusted for percent solids, sample volume, and dilution to determine the reporting detection limit. The reporting detection limits for each isomer are shown below:

Monochlorobiphenyl	3.33 μg/kg	Hexachlorobiphenyl	6.67 μg/kg
Dichlorobiphenyl	3.33 μg/kg	Heptachlorobiphenyl	10.00 μg/kg
Trichlorobiphenyl	3.33 μg/kg	Octachlorobiphenyl	10,00 μg/kg
Tetrachlorobiphenyl	6.67 μg/kg	Nonachlorobiphenyl	16.66 μg/kg
Pentachlorobiphenyl	6.67 μg/kg	Decachlorobiphenyl	16.66 μg/kg

2 - The quantitation limit presented for metals is the reporting detection limit corrected for percent solids of each sample. The reporting detection limit used by the laboratory analyzing the samples was calculated based on reported U-qualified concentrations of each analyte. These U-qualified concentrations were adjusted for sample volume to determine the reporting detection limit. The reporting detection limits for each analyte are shown below:

Cadmium	0.5 mg/kg	Mercury	0.02 mg/kg
Copper	2.0 mg/kg	Zinc	2.0 mg/kg
Lead	0.5 mg/kg		

3 - A "J"-qualifier indicates that the analyte has been positively identified in the sample, but the concentration is estimated (Ref. 15, p. 6). "J"-qualified data generated under the CLP are usable to document an observed release by chemical analysis if the concentrations are adjusted to account for the direction of any possible bias in the analysis of the sample (Ref. 15, p. 1). Although the Solutia data were not generated under the

CLP, the samples were analyzed according to EPA Method SW-846 for metals and EPA Method 680 for PCBs. The data report includes quality control data, instrument-generated data sheets, and a data validation report. Therefore, the adjustment factors are applied to qualified concentrations to be conservative and account for any bias in the analysis of the samples. A "J"-qualifier has been applied to the concentrations of metals in all three background samples, which were analyzed as solids, due to the percentage solids in the samples being reported as less than 50 percent (Ref. 40a, pp. 199-200). This is not expected to affect the accuracy of the quantitation, therefore, no bias is assigned and the concentrations are presented with no adjustment (Ref. 15, p. 8). However, the concentration of zinc received a "J"-qualifier due to an ICP serial dilution excursion (Ref. 40a, p. 59-61). This may affect the precision of the analysis and can produce either a high bias or a low bias. Because the bias in this case is unknown, the concentration of zinc detected in the background sample (370 J mg/kg) has been multiplied by the adjustment factor for zinc in the soil matrix (1.50) (Ref. 15, pp. 8, 18). This adjustment accounts fora possible low bias in the concentration of zinc in the background sample. The concentrations of zinc in the release samples are significantly greater than this adjusted background level.

Release Samples

Three sediment samples were collected at a depth of 0.2 ft from the CS-F portion of the wetland (northeastern and southern forks) (Ref. 39, pp. 3-11; Ref. 40a, App. B-4). The CS-F channel flows through the northeastern and southern portions of the wetland and carries runoff from upgradient sources. The PPE is where the intermittent portion of Dead Creek enters the wetland. Sample SED-CSF-S1 was collected closest to the PPE in the northeastern fork of the wetland along the CS-F channel (Ref. 39, pp. 3-11). Sample SED-CSF-S2 was also collected in the northeastern fork of the wetland. Sample SED-CSF-S3 was collected along the CS-F channel in the southern fork of the wetland, downgradient of the confluence of the northeastern and northwestern forks of the wetland (Ref. 39, pp. 3-11).

Sample ID	Sample Medium	Sampling Location	Depth	Date	Reference
SED-CSF-S1	sediment	NE fork of wetland	0.2 ft	October 1999	Ref. 39, pp. 3-7; Ref. 40a, App. B-4
SED-CSF-S2	sediment	NE fork of wetland	0.2 ft	October 1999	Ref. 39, pp. 3-7; Ref. 40a, App. B-4
SED-CSF-S3	sediment	southern fork of wetland	0.2 ft	October 1999	Ref. 39, pp. 3-7; Ref. 40a, App. B-4

Sample ID	Hazardous Substance	Concentration	Quantitation Limit	Reference
SED-CSF-S1	PCBs, total[1]	83 μg/kg	16 μg/kg	Ref. 40a, App. B-4e, App. C-4e; Ref. 40b, pp. 47, 102

Sample ID	Hazardous Substance	Concentration	Quantitation Limit	Reference
SED-CSF-S2	PCBs, total[1]	83 μg/kg	35 μg/kg	Ref. 40a, App. B-4e, App. C-4e; Ref. 40b, pp. 48, 102
	Cadmium	47 J mg/kg[3]	2.63 mg/kg[2]	Ref. 40a, App. B-4f; Ref. 40b, p. 71
	Copper	410 J mg/kg[3]	10.53 mg/kg[2]	Ref. 40a, App. B-4f; Ref. 40b, p. 71
	Lead	320 J mg/kg[3]	2.63 mg/kg[2]	Ref. 40a, App. B-4f; Ref. 40b, p. 71
	Mercury	1.1 J mg/kg[3]	0.11 mg/kg[2]	Ref. 40a, App. B-4f; Ref. 40b, p. 71
	Zinc	3,700 J mg/kg[3] (2,467 mg/kg)	10.53 mg/kg[2]	Ref. 40a, App. B-4f; Ref. 40b, p. 71
SED-CSF-S3	Cadmium	14 J mg/kg[3]	1.85 mg/kg[2]	Ref. 40a, App. B-4f; Ref 40b, p. 72
	Copper	240 J mg/kg[3]	7.40 mg/kg[2]	Ref. 40a, App. B-4f; Ref. 40b, p. 72

1 - The concentration presented for PCBs is the sum of the concentrations of PCB isomers detected in the sample. The quantitation limit presented for PCBs is the reporting detection limit (corrected for percent solids, sample volume, and dilution) of the isomer with the lowest detected concentration in the sample. The reporting detection limit used by the laboratory analyzing the samples was calculated based on reported U-qualified concentrations of each isomer. These U-qualified concentrations were adjusted for percent solids, sample volume, and dilution to determine the reporting detection limit. The reporting detection limits for each isomer are shown below:

Monochlorobiphenyl	3.33 μg/kg	Hexachlorobiphenyl	6.67 μg/kg
Dichlorobiphenyl	3.33 μg/kg	Heptachlorobiphenyl	10.00 μg/kg
Trichlorobiphenyl	3.33 μg/kg	Octachlorobiphenyl	10.00 μg/kg
Tetrachlorobiphenyl	6.67 μg/kg	Nonachlorobiphenyl	16.66 μg/kg
Pentachlorobiphenyl	6.67 μg/kg	Decachlorobiphenyl	16.66 μg/kg

2 - The quantitation limits presented for metals are the reporting detection limits corrected for percent solids of each sample. The reporting detection limit used by the laboratory analyzing the samples was calculated based on reported U-qualified concentrations of each analyte. These U-qualified concentrations were adjusted for sample volume to determine the reporting detection limit. The reporting detection limits for each analyte are shown below:

Cadmium	0.5 mg/kg	Mercury	0.02 mg/kg
Copper	2.0 mg/kg	Zinc	2.0 mg/kg
Lead	0.5 mg/kg		

3 - A "J"-qualifier indicates that the analyte has been positively identified in the sample, but the concentration is estimated (Ref. 15, p. 6). "J"-qualified data generated under the CLP are usable to document an observed release by chemical analysis if the concentrations are adjusted to account for the direction of any possible bias in the analysis of the sample (Ref. 15, p. 1). Although the Solutia data were not generated under the CLP, the samples were analyzed according to EPA Method SW-846 for metals and EPA Method 680 for PCBs. The data report includes quality

control data, instrument-generated data sheets, and a data validation report. Therefore, the adjustment factors are applied to qualified concentrations to be conservative and account for any bias in the analysis of the samples. A "J"-qualifier has been applied to the concentrations of metals in all three release samples, which were analyzed as solids, due to the percentage solids in the samples being reported as less than 50 percent (Ref. 40a, pp. 199-200). This is not expected to affect the accuracy of the quantitation, therefore, no bias is assigned and the concentrations are presented with no adjustment (Ref. 15, p. 8). However, the concentration of zinc received a "J"-qualifier due to an ICP serial dilution excursion (Ref. 40a, p. 59-61). This may affect the precision of the analysis and can produce either a high bias or a low bias. Because the bias in this case is unknown, the concentration of zinc detected in the release sample (3,700 J mg/kg) has been divided by the adjustment factor for zinc in the soil matrix (1.50) (Ref. 15, pp. 8, 18). This adjustment accounts for possible high bias in the concentration of zinc in the release sample. The adjusted release level of zinc is significantly greater than the adjusted background level and meets observed release criteria.

Attribution

Two separate sampling events have established an observed release by chemical analysis to the wetland along CS-F. PCBs, cadmium, copper, lead, mercury, and zinc are present in the sediments of the wetland along CS-F at concentrations significantly greater than background concentrations (Ref. 40a, App. B-4e, App. B-4f, App. C-4e, App. C-4f; Ref. 65, pp. C-2, C-3). Background concentrations were determined from samples collected in the sediments of the northwestern fork of the same wetland (Ref. 10, pp. 129-132; Ref. 39, pp. 3-11; Ref. 65, pp. 2-10). PCBs, cadmium, copper, lead, mercury, and zinc are also all documented in each of the seven sources at the site. These sources have all received direct or indirect discharges of industrial waste and contain hazardous substances typical of the industries in the area.

It is documented that the hazardous substances in every source at the site are available to migrate to surface water by overland flow and/or flood. Source 4 comes into contact with water in CS-B during periods of heavy precipitation (Ref. 38, p. 1). Sources 4, 5, and 7 are adjacent to CS-B and Source 6 is adjacent to CS-A and Source 5. Drainage from these sources is generally toward these respective segments of Dead Creek (Ref. 10, pp. 3-4). Source 1 (CS-A) historically drained to downstream segments of Dead Creek until it was re-graded to drain to the north. Water from Source 2 (CS-B) flows past the downstream blocked culvert and floods from the source area during periods of heavy precipitation. Source 3 (CS-C, CS-D, CS-E) receives runoff directly from Source 2 and indirectly from all other sources via Source 2. Source 3 drains directly to CS-F and subsequently to the wetland.

The observed releases by chemical analysis reflect commingled contamination from each source at the site. Based on the above rationale and analytical data provided in Section 2.2 and Section 4.1.2.1.1 of this document, the release of PCBs, cadmium, copper, lead, mercury, and zinc to the wetland along CS-F is attributed to the Sauget Area 1 site.

Hazardous Substances Released:

PCBs	Lead
Cadmium	Mercury
Copper	Zinc

Observed Release Factor Value: 550

4.1.2.2 Waste Characteristics

The toxicity/persistence factor value and the waste characteristics factor category value for the drinking water threat are not scored because there are no drinking water targets. The HWQ factor value is scored as it also applies to the human food chain and environmental threats.

4.1.2.2.1 Toxicity/Persistence

It is not possible to determine a predominant water category between the PPE and a nearest target for this threat. Therefore, the toxicity/persistence factor value is not scored.

Toxicity/Persistence Factor Value: NS

4.1.2.2.2 Hazardous Waste Quantity

The following table presents the quantity of hazardous waste associated with each source that has a containment value greater than zero for the overland flow/flood component of the surface water migration pathway.

Source Number	Source Name	Source Hazardous Waste Quantity Value (Section 2.4.2.1.5)	Is Source Hazardous Constituent Quantity Data Complete? (yes/no)
1	CS-A	NS	No
2	CS-B	8,356.5	No
3	CS-C through CS-E	>0	No
4	G	24	No
5	H	44	No
6	I	100	No
7	L	584.62	No
	Sum of values:	9,109.12	

The HWQ factor value is determined from HRS Table 2-6 (Ref. 1, p. 51591). The sum of the source HWQ values is 9,109.12, therefore, the assigned factor value is 100.

Hazardous Waste Quantity Factor Value: 100

4.1.2.2.3 Waste Characteristics Factor Category Value

The waste characteristics factor category value for the drinking water threat is not scored.

Toxicity/persistence factor value
x Hazardous Waste Quantity Factor Value: NS
Waste Characteristics Factor Category Value: NS

4.1.3 Human Food Chain Threat

The human food chain threat is based on the likelihood of release, waste characteristics, and targets factor category values. The likelihood of release factor category value and hazardous waste quantity factor value assigned in the drinking water threat are assigned to the human food chain threat.

4.1.3.2 Waste Characteristics

The waste characteristics factor category value for the human food chain threat is based on the toxicity/persistence/bioaccumulation factor value and the hazardous waste quantity factor value.

4.1.3.2.1 Toxicity/Persistence/Bioaccumulation

The table below includes toxicity, persistence, and human food chain bioaccumulation factor values for those hazardous substances that have been detected in the Sauget Area 1 sources and are available to migrate to surface water. Additionally, PCBs, cadmium, copper, lead, mercury, and zinc are also documented in the observed releases by chemical analysis. The individual factor values were obtained from the EPA SCDM, and the combined toxicity, persistence, and bioaccumulation factor values were obtained from Table 4-16 of the HRS (Ref. 1, p. 51619; Ref. 2).

Hazardous Substance	Source	Toxicity Factor Value	Persistence Factor Value[1]	Bioaccumulation Potential Factor Value	Toxicity/ Persistence/ Bioaccumulation	Reference
PCBs	2,3,5,6,7	10,000	1	50,000	5×10^8	2; Section 2.2
Arsenic	2,3,5,6,7	10,000	1	5	50,000	2; Section 2.2
Cadmium	2,3,5,6,7	10,000	1	5,000	5×10^7	2; Section 2.2
Chromium, total	2,3	10,000	1	5	50,000	2; Section 2.2
Copper	2,3,5,6,7	--	1	50,000	--	2; Section 2.2
Lead	2,3,5,6,7	10,000	1	50	5×10^5	2; Section 2.2
Mercury	2,3,5,6,7	10,000	0.4	50,000	2×10^8	2; Section 2.2
Zinc	2,3,5,6,7	10	1	500	5,000	2; Section 2.2

1 - The in-water segment between the PPE and the nearest downstream fishery scored in this documentation record consists of the CS-F wetland, Dead Creek, Old Prairie duPont Creek, and the Cahokia Chute. Therefore, the predominant water category between the PPE and the nearest downstream fishery is 'river' and the river persistence values are assigned for each hazardous substance (Ref. 1, Section 4.1.3.2.1.2, p. 51617).

The toxicity/persistence/bioaccumulation factor value for the human food chain threat is based on PCBs, which is assigned a toxicity value of 10,000, a persistence value of 1, and a bioaccumulation value of 50,000. Thus, the toxicity/persistence/bioaccumulation factor value is 500,000,000, or 5×10^8, the highest value assigned to any hazardous substance.

Toxicity/Persistence/Bioaccumulation Factor Value: 5×10^8

4.1.3.2.2 Hazardous Waste Quantity

The hazardous waste quantity factor value of 100 assigned in Section 4.1.2.2.2 of this document is also assigned in the human food chain threat (Ref. 1, Section 4.1.3.2.2, p. 51620).

Hazardous Waste Quantity Factor Value: 100

4.1.3.2.3 Waste Characteristics Factor Category Value

The toxicity/persistence factor value for PCBs is 10,000. This combined factor value multiplied by the hazardous waste quantity factor value of 100 results in a product of 1×10^6.

Toxicity/persistence factor value
x hazardous waste quantity factor value: 1×10^6

The above product (1×10^6) multiplied by the bioaccumulation potential factor value for PCBs (50,000) results in a product of 5×10^{10}. According to Table 2-7 of the HRS, a waste characteristics factor category value of 320 is assigned (Ref. 1, p. 51592).

(Toxicity/persistence x hazardous waste quantity)
x bioaccumulation potential factor value: 5×10^{10}

Waste Characteristics Factor Category Value: 320

4.1.3.3 Human Food Chain Threat-Targets

Fisheries downstream of the Sauget Area 1 site exist in Old Prairie duPont Creek, Cahokia Chute, and the Mississippi River (Refs. 42; Ref. 43). The observed releases to surface water are documented to the wetland along CS-F. Although there are fish in the wetland along CS-F, documentation is not currently available that people catch and consume these fish. Therefore, the nearest fishery is Old Prairie duPont Creek, which is downstream of the wetland (Ref. 42). Old Prairie duPont Creek is also downstream of the farthest downstream release sample, therefore, no human food chain targets are documented to be subject to Level I or II concentrations at this time.

4.1.3.3.1 Food Chain Individual

PCBs, cadmium, copper, mercury, and zinc have bioaccumulation potential factor values of 500 or greater and were detected in observed release by chemical analysis samples. Fisheries exist within the TDL and hazardous substances with bioaccumulation potential values of 500 or greater are documented in the observed releases. Therefore, a food chain individual factor value of 20 is assigned (Ref. 1, Section 4.1.3.3.1, p. 51620).

Sample ID: F102; F103; F104; F108; F109; SED-CSF-S1; SED-CSF-S2; SED-CSF-S3
Hazardous Substances: PCBs; cadmium; copper; mercury; and zinc
Bioaccumulation Potential: 50,000; 5,000; 50,000; 50,000; 500

Food Chain Individual Factor Value: 20

4.1.3.3.2 Population

The following subsections identify the population factor values for the human food chain threat.

4.1.3.3.2.1 Level I Concentrations

No human food chain targets are known to be subject to Level I concentrations.

Level I Concentrations Factor Value: 0

4.1.3.3.2.2 Level II Concentrations

No human food chain targets are known to be subject to Level II concentrations.

Level II Concentrations Factor Value: 0

4.1.3.3.2.3 Potential Human Food Chain Contamination

Three documented fisheries are located within the 15-mile TDL for the surface water migration pathway: Old Prairie duPont Creek, Cahokia Chute, and the Mississippi River (Ref. 42; Ref. 43). The calculation of the potential human food chain contamination factor value is based on annual fishery production rates and average annual flows. These values are not available for Old Prairie duPont Creek or Cahokia Chute (Ref. 43; Ref. 44, Ref. 45). Therefore, although the fisheries in Old Prairie duPont Creek and Cahokia Chute are subject to potential contamination, there is currently insufficient information to document a score for these fisheries. The annual production of these fisheries can be assumed to be greater than zero, however, no flow data are available for Old Prairie duPont Creek or Cahokia Chute. Therefore, only the fishery in the Mississippi River is scored for the potential human food chain contamination factor value. Annual production, average annual flow, and the calculation of the potential human food chain contamination factor value are summarized in the following table.

Identity of Fishery	Annual Production (pounds)	Type of Surface Water Body	Average Annual Flow (cfs)	Reference	Population Value (P_i)	Dilution Weight (D_i)	$P_i x D_i$
Mississippi River	21,738[1]	Very large river	>100,000	Ref. 43; Ref. 44	31	0.00001	3.1×10^{-4}

Sum of P_i x D_i: 3.1×10^{-4}

(Sum of P_i x D_i)/10: 3.1×10^{-5}

1 - The annual production value for the Mississippi River within the TDL (approximate river miles 161 to 174) is not specifically measured (Ref. 36; Ref. 43; Ref. 45). Data for the harvest between river mile 0 and 200.5 was averaged over two years, divided by 200.5 river miles, and multiplied by the number of miles in the TDL to estimate the annual production for the 12.2 miles of the Mississippi River that falls in the TDL. The calculations for the annual production of the Mississippi River fishery are as follows:

437,512 pounds in 1990 (Ref. 36)
+277,007 pounds in 1991 (Ref. 36)
714,519

714,519/ 2 = 357,259.5 pounds (average production for two years)

357,259.5 pounds/ 200.5 river miles = 1,781.8 pounds per river mile

Annual production for the Mississippi River within the TDL:

1,781.8 pounds per river mile x 12.2 river miles in TDL = 21,738 pounds

Potential Human Food Chain Contamination Factor Value: 3.1×10^{-5}

4.1.4 Environmental Threat

The environmental threat is based on the likelihood of release, waste characteristics, and targets factor category values. The likelihood of release factor category value and hazardous waste quantity factor value assigned in the drinking water threat are also assigned to the environmental threat.

4.1.4.2 Waste Characteristics

The following subsections describe the evaluation of the waste characteristics factor category value of the environmental threat.

4.1.4.2.1 Ecosystem Toxicity/Persistence/Bioaccumulation

The table below shows ecosystem toxicity, persistence, and environmental bioaccumulation factor values for those hazardous substances that have been detected in the Sauget Area 1 sources and are available to migrate to surface water. Additionally, PCBs, cadmium, copper, lead, mercury, and zinc are documented in the observed releases by chemical analysis. The individual factor values were obtained from the EPA SCDM, and the combined ecosystem toxicity/persistence/bioaccumulation factor values were obtained from Table 4-21 of the HRS (Ref. 1, p. 51622; Ref. 2).

Hazardous Substance	Source No.	Ecosystem Toxicity Factor Value	Persistence Factor Value	Environmental Bioaccumulation Factor Value	Ecosystem Toxicity/ Persistence/ Bioaccumulation Factor Value	Reference
PCBs	2,3,5,6,7	10,000	1	50,000	5×10^8	2; Section 2.2
Arsenic	2,3,5,6,7	10	1	500	5,000	2; Section 2.2
Cadmium	2,3,5,6,7	1,000	1	5,000	5×10^6	2; Section 2.2
Chromium, total	2,3	100	1	5	500	2; Section 2.2
Copper	2,3,5,6,7	100	1	50,000	5×10^6	2; Section 2.2
Lead	2,3,5,6,7	1,000	1	5,000	5×10^6	2; Section 2.2
Mercury	2,3,5,6,7	10,000	0.4	50,000	2×10^8	2; Section 2.2
Zinc	2,3,5,6,7	10	1	500	5,000	2; Section 2.2

1 - The PPE is into the wetland along CS-F. This wetland and the habitat it provides for a State designated endangered species are the nearest sensitive environments being scored in this documentation record. Therefore, the river persistence values are assigned for each hazardous substance (Ref. 1, Section 4.0.2, p. 51605, Section 4.1.4.2.1.2, p. 51622).

The ecosystem toxicity/persistence/bioaccumulation factor value is assigned based on PCBs. PCBs is assigned an ecosystem toxicity value of 10,000, a persistence value of 1, and an environmental bioaccumulation value of 50,000. Thus, the ecosystem toxicity/persistence/bioaccumulation factor value is 500,000,000, or 5×10^8, the highest value assigned to any hazardous substance.

Ecosystem Toxicity/Persistence/Bioaccumulation Factor Value: 5×10^8

4.1.4.2.2 Hazardous Waste Quantity

The hazardous waste quantity factor value of 100 assigned in Section 4.1.2.2.2 of this document is also assigned to the environmental threat (Ref. 1, Section 4.1.4.2.2, p. 51624)

Hazardous Waste Quantity Factor Value: 100

4.1.4.2.3 Waste Characteristics Factor Category Value

The combined ecosystem toxicity/persistence factor value for PCBs is 10,000. This value multiplied by the hazardous waste quantity factor value of 100 results in a product of 1×10^6.

Ecosystem toxicity/persistence factor value
x hazardous waste quantity factor value: 1×10^6

The ecosystem bioaccumulation potential factor value for PCBs is 50,000. This value multiplied by the above product of 1×10^6 results in a product of 5×10^{10}. According to Table 2-7 of the HRS, a waste characteristics factor category value of 320 is assigned (Ref. 1, p. 51592).

(Ecosystem toxicity/persistence x hazardous waste quantity)
x ecosystem bioaccumulation potential factor value: 5×10^{10}

Waste Characteristics Factor Category Value: 320

4.1.4.3 Environmental Threat - Targets

Most Distant Level I Sample

No Level I samples have been identified for the environmental threat.

Most Distant Level II Sample

Sample ID: SED-CSF-S3
Distance from the probable point of entry: 3,000 ft
Reference: Ref. 39, pp. 3-7

4.1.4.3.1 Sensitive Environments

The following subsections describe the listed sensitive environments and wetlands located within the 15 mile TDL.

4.1.4.3.1.1 Level I Concentrations

No environmental targets are known to be subject to Level I concentrations.

Level I Concentrations Value: 0

4.1.4.3.1.2 Level II Concentrations

Sensitive Environments

During an April 1997 Preliminary Ecological Risk Assessment, the black-crowned night heron was observed in the wetland along CS-F (Ref. 65, p. 2-3). The black-crowned night heron is a State listed endangered species in the State of Illinois (Ref. 29, p. 4). Therefore, the wetland is documented as habitat known to be used by a State designated endangered species. Based on the analytical data presented in Section 4.1.2.1.1 of this document, the wetland along CS-F and this listed sensitive environment are subject to Level II concentrations of PCBs, cadmium, chromium, copper, lead, mercury, and zinc (Ref. 39, pp. 3-11; Ref. 40a, App. B-4, App. C-4).

Sensitive Environment	Sensitive Environment Assigned Value (Table 4-23)	Reference
Habitat known to be used by a State designated endangered or threatened species:		Ref. 29, p. 4; Ref. 65, p. 2-3
Black-crowned night heron - endangered	50 50 total	

Sensitive Environments Value: 50

Wetlands

The farthest downstream release sample documenting Level II concentrations is SED-CSF-S3, which was collected in the CS-F wetland. This wetland is denoted on a U.S. Fish and Wildlife Service NWI map as a palustrine, forested wetland and was delineated by the Illinois Department of Conservation (Ref. 24, p. 4, 5; Ref. 25). Palustrine, forested wetlands meet the definition of a wetland for HRS purposes (Ref. 1, Table 4-24, p. 51625). The PPE is to the CS-F wetland, therefore, the perimeter of the wetland may be scored for the Level II concentrations factor value (Ref. 1, Section 4.1.4.3.1.2, p. 51625). However, the frontage of wetland along the CS-F channel provides a conservative estimate of the total length of wetland eligible to be scored for the Level II concentrations factor value and is used for scoring purposes in this HRS documentation package.

Based on the scale provided with the sampling location maps, SED-CSF-S3 was collected approximately 3,000 ft from the PPE (Ref. 39). Because wetland vegetation exists along either side of Dead Creek within this reach, 6,000 ft of wetland frontage is considered subject to Level II concentrations (Ref. 1, Section 4.1.4.3.1.2, p. 51625; Ref. 39). The wetlands value was obtained from Table 4-24 of the HRS (Ref. 1, p. 51625).

Wetlands classified as palustrine, emergent wetlands are also located along the upper segments of Dead Creek that are evaluated as sources (CS-B, CS-C, CS-D, and CS-E) (Ref. 24; Ref. 25). However, these wetlands may be isolated from the wetland along CS-F by an intermittent portion of Dead Creek and, therefore, are not evaluated as targets for this watershed (Ref. 24, p. 14; Ref. 25).

Wetland	**Wetland Frontage**	**Reference**
CS-F	6,000 ft	Ref. 25; Ref. 39

Total Wetland Frontage: 6,000 ft

Wetland Value: 50

Sum of Sensitive Environments Value + Wetland Value: 100

Level II Concentrations Value: 100

4.1.4.3.1.3 Potential Contamination

Sensitive Environments

Sensitive environments subject to potential contamination along the surface water migration pathway include habitats known to be used by both Federal and State designated endangered and threatened species. At least, four species of birds that are endangered in Illinois nest in a significant rookery immediately east of Sauget: black-crowned night heron, yellow-crowned night heron, little blue heron, and snowy egret (Ref. 29, p. 4; Ref. 31, pp. 80, 81, 89; Ref. 46; Ref. 66, pp. 2, 4). These species of birds are likely to feed in wetlands and the Mississippi River within 10 miles of the nesting site (Ref. 36; Ref. 66, p. 2). In addition, the bald eagle, a Federal threatened species, has nested on Arsenal Island, where Cahokia Chute meets the Mississippi River (Ref. 30, p. 1; Ref. 37; Ref. 66, pp. 2, 4). Both Cahokia Chute and the Mississippi River are considered habitat for the bald eagle. Average annual flow data are not available for Cahokia Chute. Therefore, the bald eagle habitat is evaluated for the Mississippi River.

According to the Illinois Endangered Species Protection Board, the Mississippi River in St. Clair and Monroe Counties, which border the TDL, is habitat used by the Indiana bat, a Federal designated endangered species, and another seven State designated endangered or threatened species (Ref. 30, p. 2; Ref. 31, p. 102; Ref. 66; Ref. 64). In addition, one Federal endangered fish species and one snail species endangered in Missouri exist in the Mississippi River within the TDL (Ref. 30, p. 4; Ref. 41; Ref. 49, pp. 1, 2; Ref. 64, p. 2). One Federal threatened plant species is known to exist along the Mississippi River within the TDL (Ref. 30, p. 3; Ref. 49; Ref. 65, p. 2-2). Sensitive environments subject to potential contamination from the Sauget Area 1 site are summarized in the table below. Sensitive environment values were obtained from Table 4-23 of the HRS (Ref. 1, p. 51624). The habitat for each species is considered a separate sensitive environment, and the values for each species were added together for each type of surface water body.

At least two other State-designated bird species are present in proximity to the site. These are the peregrine falcon (endangered) and the least bittern (threatened) (Ref. 29, p. 4; Ref. 64). Due to inadequate documentation placing these habitats within the TDL of 15 miles downstream, these habitats have not been included in the calculation of the potential contamination factor value.

4.1.4.3.1.3 Potential Contamination (continued)

Type of Surface Water Body (Table 4-13)	Sensitive Environment (Table 4-23)	Sensitive Environment Value(s)	References
Mississippi River (very large river)	Habitat known to be used by a Federal designated endangered or threatened species:		Ref. 30, pp. 2, 3, 4; Ref. 31, pp. 85, 102; Ref. 46; Ref. 49, pp. 1, 2;
	Bald eagle - threatened	75	
	Indiana bat - endangered	75	
	Decurrent false aster - threatened	75	
	Pallid sturgeon - endangered	75	
	Habitat known to be used by a State designated endangered or threatened species:		Ref. 29, pp. 3, 4, 5; Ref. 31, pp. 65, 74, 80, 81, 83, 91, 99; Ref. 41; Ref. 46
	Cave snail - endangered (MO)	50	
	Illinois chorus frog - threatened	50	
	American bittern - endangered	50	
	Little blue heron - endangered	50	
	Snowy egret - endangered	50	
	Yellow-crowned night heron - endangered	50	
	Common moorhen - threatened	50	
	Pied-billed grebe - threatened	50	
	River otter - threatened	50	
	Sum of Values:	750	

Wetlands

Palustrine wetlands are located along Old Prairie duPont Creek, Cahokia Chute, and the Mississippi River within the TDL (Ref. 25; Ref. 26; Ref. 27). Approximately 2,112 ft of wetland frontage is present along Old Prairie duPont Creek and approximately 1 mile of wetland frontage is present along Cahokia Chute (Ref. 25). Although these wetlands are subject to potential contamination, average annual flow data are not available for Old Prairie duPont Creek or Cahokia Chute. Therefore, there is currently insufficient information to document a score for these wetlands and they are not included in the calculation of the potential contamination factor value for the environmental threat. The wetland adjacent to Dead Creek in CS-F is subject to Level II concentrations and is not included in the evaluation of wetlands subject to potential contamination. Wetland frontage along the Mississippi River within the TDL was measured from NWI maps and is summarized below (Ref. 25; Ref. 26; Ref. 27).

4.1.4.3.1.3 Potential Contamination (continued)

Type of Surface Water Body	Wetlands Frontage	Reference(s)	Wetlands Rating Value for Type of Surface Water Body
Mississippi River (very large river)	60,300 ft (11.42 miles)	Ref. 1, Table 4-24; Ref. 25; Ref. 26; Ref. 27	250

The following table summarizes the sensitive environment and wetland values for each of the applicable surface water bodies and shows the calculations used for the potential contamination factor value.

Type of Surface Water Body	Sum of Sensitive Environment Values (S_j)	Wetland Frontage Value (W_j)	Dilution Weight (D_j)	$D_j(W_j + S_j)$
Mississippi River (very large river)	750	250	0.00001	0.01

The sum of the dilution-weighted values for listed sensitive environments and wetlands is divided by 10 to calculate the potential contamination factor value of 0.001.

Sum of $D_j(W_j + S_j)$: 0.01
(Sum of $D_j(W_j + S_j)$)/10: 0.001

Potential Contamination Factor Value: 0.001